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GUIDELINES FOR THE DEVELOPMENT AND IMPLEMENTATION OF A LOGISTIC RESOURCE ANNEX TO THE FIVE YEAR DEFENSE PROGRAM

VOLUME I: The DoD LRA System

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COST ANALYSIS GROUP

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20. weapon system. The paper provides comprehensive coverage of the Air Force, Navy and Marine Corps. Coverage is less comprehensive on the Army because of work on this topic by the General Research Corporation.

Volume I establishes the framework for the research. It includes considerable material relating to the characteristics of logistic data and the ways in which financial manpower logistic data should be treated in the Service LRAs. This volume also contains the results of research on an LRA for the Army, and presents recommendations on an OSD-level LRA data system.

Volumes II, III, and IV cover the Navy, Air Force, and Marine Corps respectively. Each of these volumes discusses in depth the Service data systems that are applicable to the LRA and describes the Service LRA data base coverage. A data element reference guide is presented for each Service to show explicitly how the Service could support each line in the LRA and the relevant data systems. Each of the volumes contains an appendix in which there is extensive discussion of how the particular Service could treat each category of logistic resources in satisfying the LRA requirement.

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PREFACE

This study, prepared by the Cost Analysis Group of the Institute for Defense Analyses, reports on work accomplished for the Office of the Assistant Secretary of Defense for Manpower, Reserve Affairs and Logistics. The study provides guidelines to be used by each of the Military Services in producing a Logistic Resource Annex (LRA) to that Service's Five Year Defense Program (FYDP).

As a specialized annex to the FYDP, the LRA would present as a discrete entity information that in many cases is included in the aggregate totals for several categories of resources in the FYDP. The LRA would be updated concurrent with each updating of the FYDP. The LRAs would show all Service logistic resources by logistic function, and for certain types of resources would also show what volume of resources would be required to support selected weapon systems.

The study comprises four volumes plus a separate Executive Summary. Each volume contains a summary of the material in that volume; the Executive Summary covers the entire study. Volumes II, III, and IV present LRA guidelines for the Navy, Air Force, and Marine Corps, respectively. In this volume we present an introduction to the entire study, an assessment of the compatibility of the General Research Corporation's Army LRA with IDA's LRA guidelines for the other Services, recommendations for an OSD-level LRA data base, and analyses of key conceptual issues that apply to LRAs in all of the Services.

We would like to express our gratitude to the members of the technical review board, who provided us with timely and useful guidance concerning the direction, scope, and contents of this paper. Board members from outside IDA were Dr. Joseph H. Augusta of MATHTECH, Mr. Brent D. Bradley of RAND, and Mr. Joseph W. Noah of J. Watson Noah Associates. Mr. James D. McCullough of IDA served as chairman of the technical review board.

We would also like to acknowledge the valuable assistance of the many OSD and Service personnel with whom we worked, particularly Mr. Charles Groover and Mr. Charles Alcorn, who monitored the study for OASD/MRA&L.

GLOSSARY

ADP	Automatic Data Processing
AFP	Army Force Program
AMP	Army Materiel Plan
AMSCO	Army Management Structure Code
BAC	Budget Activity Code
BOIP	Basis of Issue Plan
BOS	Base Operating Support
CBS	Civilian Budgeting System
DNFYP	Department of Navy Five Year Program
DoD	Department of Defense
DODH	Department of Defense Handbook
DODI	Department of Defense Instruction
F&FP	Force and Financial Plan
FAS	Force Accounting System
FYDP	Five Year Defense Program
GRC	General Research Corporation
HQDA	Headquarters, Department of Army
IF	Industrially Funded
LMI	Logistics Management Institute
LRA	Logistic Resource Annex
MBO	Management by Objective
MCP	Military Construction Program
MILPERS	Military Personnel
MIS	Management Information System
MOS	Military Occupational Speciality
MPA	Missile Procurement, Army
MS	Maintenance Subsystem

NCIS/FYDP	Navy Cost Information System/Five Year Defense Program
OASD(MRA&L)	Office of the Assistant Secretary of Defense/ Manpower, Reserve Affairs and Logistics
OASD(PA&E)	Office of the Assistant Secretary of Defense/ Program Analysis and Evaluation
ODCSRDA	Office of the Deputy Chief of Staff for Research, Development and Acquisition
O&M	Operations and Maintenance
OMA	Operations and Maintenance, Army
OSD	Office, Secretary of Defense
OSCER	Operating and Support Cost Estimating Report
PAA	Procurement of Ammunition, Army
POM	Program Objective Memorandum
PPB	Planning, Programming and Budgeting
PPBS	Planning, Programming and Budgeting System
PROBE	Program Optimization and Budget Evaluation System
PROBUS	Program Budget System
R&D	Research and Development
RMS	Resource Management System
SACS	Structure and Composition System
SCN	Snipbuilding and Construction, Navy
SSN	Standard Study Number
TAADS	The Army Authorization Documents System
TOA	Total Obligational Authority
TOE	Table of Organization and Equipment
TSS	Total Support System
UIC	Unit Identification Code
VAMOSC	Visibility and Management of Support Costs
WPN	Weapons Procurement, Navy

SUMMARY

In this volume we provide some introductory material to, and a conceptual framework for our study of what guidelines the Services could follow in producing Logistic Resource Annexes to their Five Year Defense Programs. This volume also covers some special topics relevant to all Service LRAs and includes our assessment of Army capabilities to produce an LRA.

Separate, comprehensive volumes have been prepared for the Navy, Marine Corps, and Air Force, which indicate the implications of our research for those Services. The General Research Corporation has been conducting studies since 1975 on the development of an Army capability to fulfill the OSD LRA requirement. We have therefore reviewed General Research Corporation's work to see if the conclusions are compatible with the approach we took in our guidelines for the other Services. The results of this review are presented in Chapter VI and Appendix A.

A. THE PROBLEM

It is estimated that logistic support consumes about 35 percent of the resources provided annually to the Department of Defense through the appropriation process. Although these resources are substantial and are critical to mission readiness, currently the Department of Defense Planning, Programming, and Budgeting System (PPBS) does not produce displays of those logistic resources suitable for planning, programming, and analysis.

Prior research on this problem and additional research performed for this study have enabled us to develop guidelines

on how the Services can produce Logistic Resource Annexes to their Five Year Defense Programs so that the analytical requirements of OASD(MRA&L) can be fulfilled. These guidelines assume use of the existing capabilities of Service planning, programming, and budgeting systems and associated data systems. Modifications and extensions to these systems are recommended as required. In some instances, these modifications and extensions will entail considerable additional workload, especially to establish initial capabilities.

B. THE LOGISTIC RESOURCE ANNEX STRUCTURE

The LRA structure requires the accumulation of logistic resource data into categories that discriminate among different kinds of logistic functions and lend themselves to OSD analysis. OASD(MRA&L) developed the basic structure and we recommend only minor modifications. In addition to displaying resources in functional categories, resources in the category "Maintenance, Modification and Technical Support of Equipment" must be shown according to certain weapon systems, to be identified by OSD.

The resources included in the LRA are a subset of the total resources included in the FYDP; the only Research and Development Appropriation-financed resources to be included are some operating resources. Dollars are to be identified in terms of total obligational authority and manpower in terms of fiscal year end-strengths.

LRAs would be prepared and submitted to OSD three times a year: with the annual Service Program Objective Memorandum, with the annual Service budget, and with the information to update the FYDP to reflect the President's annual budget submission to the Congress. It is contemplated that the LRA will be a basic component of the DoD PPBS and will be processed concurrently with the other elements of that system.

C. FINANCIAL DATA CONCEPTS

Two categories of financial data will be shown in the LRA: dollars for investment and dollars for operating resources. The logistic resources acquired through the procurement appropriations will include spares and repair parts, modification equipment, munitions, and logistic support equipment; procurement appropriation dollars used for industrial preparedness will also be shown. With the exception of initial spares and industrial preparedness, these resources are attributable to the operating phase rather than the acquisition phase of the equipment life cycle.

The FYDP Procurement Annex and budget backup forms provide most of the information necessary to satisfy the LRA requirements relating to procurement-appropriation-financed resources. Showing replenishment spares data by selected weapon systems will require some allocation of data by statistical methods.

The other major investment resources shown are those used for major construction. OSD already requires information on this area in detail sufficient to satisfy the LRA requirements, so no additional workload is required.

Operating resources are financed primarily by Service Operations and Maintenance and Military Personnel appropriations plus the corresponding Reserve appropriations. Information on centrally managed operating resources such as for depot maintenance is generally available now in the categories required by the LRA. However, to obtain the necessary information on field-managed resources it will be necessary for all of the Services to expand their current capabilities significantly. Much of this additional workload will be necessary to obtain manpower data.

D. MANPOWER DATA CONCEPTS

The fiscal year end-strengths of civilian and military manpower programmed to provide logistic support in the Services must be identified according to the logistic functions in the LRA. Currently, the Air Force and Navy have automated manpower data bases that can satisfy this requirement (with some extension of capabilities). The Army and Marine Corps do not have such functional manpower data bases, so considerable staff work may be required to meet the LRA requirement. Manpower end-strength data need not be shown by weapon systems, although manpower costs are included in the total operating cost information that must be shown by the OSD-selected weapon systems.

Fulfilling the LRA requirements for manpower data is a complicated process primarily because of the different ways in which logistic support manpower can be identified. For example, logistic job codes are used to identify some individuals who are working in nonlogistic positions, while others who are working in logistic support positions are not so identified. In some instances the same job title may be used for manpower performing different logistic functions. For example, a supply clerk in an F-15 squadron can be considered to be performing a supply function, while a supply clerk working in an intermediate maintenance squadron may be considered to be performing primarily a maintenance support function.

IDA has recommended the following methods be used to determine manpower end-strengths by logistic functional category:

(1) Identify Service manpower in terms of logistic functions performed regardless of the actual job codes.

(2) Identify all manpower in primary logistics mission organizations according to the functional area that corresponds to the primary mission of that organization.

(3) For the manpower in organizations whose primary mission is not logistics, identify logistics people based on the functions they are performing within the organization.

E. THE LRA AND VAMOSC

The OSD-directed Visibility and Management of Support Costs (VAMOSC) program requires the identification of operating and support costs by weapon system. Logistic resources are included in the support cost category, so the LRA and VAMOSC programs are addressing similar, although not necessarily identical, resource areas. OASD(MRA&L) asked IDA to examine the VAMOSC program to determine its possible relationship to the LRA program.

By comparing the two programs we found the following major differences:

(1) Logistic resource coverage. The LRA is a comprehensive set of data that includes all logistic resources in the FYDP, while VAMOSC management information systems only produce data on some logistic resources in the FYDP, as well as operating resources that are not included in the LRA.

(2) Fiscal year coverage. The LRA includes data elements for all the FYDP program years, while VAMOSC systems include on y data for prior fiscal years.

(3) Identification of resources to weapon systems. The LRA includes some data elements that relate directly to individual weapon systems as well as data elements that do not relate directly to weapon systems. All VAMOSC data elements are intended to relate directly to individual weapon systems and in some cases to individual subsystems.

(4) Reconciliation with the FYDP data. The LRA is designed as an annex to the FYDP with dollars that can be tracked to FYDP totals; VAMOSC management information systems are not intended to reconcile dollar totals with FYDP totals.

(5) Manpower end-strengths. The LRA includes information on authorized manpower end-strengths; VAMOSC management information systems are not designed to include such data.

On the basis of this examination we have concluded that, although they use related data, the LRA and VAMOSC programs serve different purposes. The VAMOSC systems may be used to develop factors for the allocations required to produce some LRA data, but neither program can satisfy fully the total requirements of both programs.

F. THE ARMY LRA

Our treatment of the Army in this study was based primarily on completed and ongoing research by the General Research Corporation (GRC). At the time our study was conducted GRC was completing an actual trial run of an Army LRA using an LRA structure almost identical to the OASD(MRA&L) structure.

Although the functional categories of the two LRAs are almost the same, GRC did not address the following questions that are covered in this study:

(1) How to identify manpower end-strengths to logistic functions.

(2) How to identify maintenance, modification, and technical support of equipment resources to selected weapon systems.

(3) How to develop a "system" by the Service to produce recurring updates of the LRA.

Our research focused on the degree to which the GRC approach to developing an LRA for the Army was compatible with the approaches we recommended the other Services use. It was also necessary to determine whether the GRC approach could be extended to satisfy the OSD requirements for manpower end-strength and weapon system information. Our observations and conclusions are as follows:

(1) Both approaches rely on Procurement Annex information as a source for identification of procurement data and distribution of that data by logistic function.

(2) The GRC approach made extensive use of factors and statistical allocations to produce outyear and field-level operating cost data, while our approach attempted to use program data.

(3) The two approaches treat construction resources similarly.

(4) The Army's BOS Resource Management System carries more detail that is useful for the LRA than is available in the other Services.

(5) The GRC allocation factors for dollars could be used to allocate manpower end-strengths.

(6) Additional research is required to determine how the Army could satisfy the LRA requirement for identification of some logistic resources by weapon system.

The Army is developing a management information system, the Program Optimization and Budget Evaluation System (PROBE), that is designed to tie various Army data systems together into a centralized management information system. Once PROBE is perfected it could be the basis for an approach to an Army LRA similar to the approach we recommend for the other Services. This centralized management information system could permit lower level detail on dollars and manpower to be directly associated in the FYDP update process with FYDP PEs and LRA functional categories. Even after PROBE is implemented, however, further work would be necessary for the Army to fulfill the requirement for identification of resources by selected weapon systems.

G. AN OSD-LEVEL DATA SYSTEM

Our research was also intended to determine the most suitable methods to be employed to establish and update an LRA data base at the OSD level. It was assumed that LRA data must be handled at the SECRET security classification level and that the

LRAs would be published annexes to the OSD FYDP as are the Procurement Annexes. No requirement exists for real-time access to the LRA data.

Through use of sizing methods assuming given numbers of weapon systems and the values for other variables, we determined that the maximum number of data elements in all of the Service LRAs should be about 310,800. This finding was based on there being 44,400 data elements for each of the 7 years covered by a published FYDP.

We recommend that an OSD-level data base be maintained and updated in a central OSD-level system with data submitted on tape from the Services, rather than in separate Service systems. It is important that the data system have the capability to store historical data covering an extended period of time. Of the systems currently available within OSD, the Honeywell System A would be the system of choice for satisfying the OSD-level LRA data system requirement.

Chapter I

INTRODUCTION

This paper presents the results of an IDA study intended to develop guidelines for each of the military services to use to produce a Logistic Resource Annex (LRA) to the Five Year Defense Program. This LRA is designed to make visible the logistic resources programmed in the FYDP just as the Procurement Annex makes procurement resources visible. The LRA would be published concurrent with each official updating of the FYDP. It would show all logistic resources classified into appropriate functional categories, and some resources would also be categorized according to selected weapon systems. These LRAs would provide OASD(MRA&L) with direct access to data on the logistic resources in the FYDP and would permit analysis of these logistic resources, including their relationship to mission readiness, as required.

As defined by OASD(MRA&L), logistic resources include the dollars and manpower needed to support peacetime materiel readiness, post D-day combat sustainability, logistic management and support activities, and installations and facilities.

A. BACKGROUND AND CONTENT OF THE STUDY

Logistic support consumes about 35 percent of the funds provided to the Department of Defense.[1] These resources are consumed by DoD activities at all levels, from the organizational through intermediate to the large central depot-level

[1]Based on the definition of logistic support in the LRA provided by the Office of the Assistant Secretary of Defense for Manpower, Reserve Affairs and Logistics and data in Service POM submittals of May 1978.

logistic support organizations. Existing management information system structures--the FYDP and related subsystems--do not provide the desired displays of these logistic support resources by function, organization, weapon system, or other categories important for planning, programming, and analysis.

In 1975 OASD(PA&E) initiated research to improve the visibility of DoD logistic resources to aid in decisionmaking with regard to these resources. In 1976 the Institute for Defense Analyses, under contract to OASD(PA&E), completed detailed studies that defined an LRA and possible supporting data systems for the Department of Navy Five Year Program (DNFYP).[1] In May 1977 the Logistics Management Institute published an exploratory study intended to define a general LRA concept for the Air Force. In December 1977 the General Research Corporation completed a study leading to the development of an LRA for the Army.

Using these studies and internal evaluations of OSD logistic resource data needs as a basis, OASD(MRA&L) developed a proposed LRA structure to identify the categories of resources for which data are required. OASD(MRA&L) asked IDA to validate the suitability of this structure and assess the capabilities of existing or potential Service data systems to fulfill the LRA data requirements so identified. Recognizing that existing or potential Service data systems might not be able to fulfill all LRA requirements, OASD(MRA&L) asked IDA to develop preliminary recommendations on necessary modifications of Service data systems or methods of estimating some data elements statistically so that all needs for data could be met. IDA was asked to produce an LRA data element reference guide that identifies the

[1]John D. Morgan, et al., *A Phase I Report on a Proposed Navy FYDP Logistic Resource Data Base Structure and Associated Resource Displays*, IDA P-1194, and *A System to Produce a Logistic Resource Annex to the Navy Five Year Defense Program*, IDA S-484; Aaron B. Fuller, *A Structure and Formats for Displaying Estimates of Future Security Assistance Programs in the Navy*, IDA P-1248.

sources, data reporting channels, and methods of calculating or estimating data elements and categories. Finally, OASD (MRA&L) asked IDA to develop preliminary recommendations regarding systems, procedures, and resources that would be required to establish and operate an OSD-level LRA data system.[1]

This paper presents the results of IDA's work. This volume contains a summary, introductory material relevent to the entire project, a chapter comparing the LRA and outputs of the Visibility and Management of Operating and Support Costs (VAMOSC) project, a chapter on an LRA for the Army, and, finally, a chapter on how the LRA information might be obtained from the Services and processed into a data file for OSD to use.

Volumes II, III, and IV present the LRA guidelines for the Navy, Air Force, and Marine Corps, respectively. Each of these volumes contains information on how the particular Service could produce an LRA as part of the regular PPBS process. Each volume also contains an appendix that discusses, in detail, the characteristics of the resources covered by each line in the LRA structure and what methods the Service could use to produce data for each line as well as provide data on logistic support for selected weapon systems.

B. ASSUMPTIONS AND GUIDELINES

This research was performed within the framework of certain assumptions deemed necessary to the production of results that would be most useful to OSD. We assumed, first, that the study should be mainly concerned with how the Service data systems could best support the OSD-developed LRA structure. Although we were free to propose reasonable changes to that structure, our research was not intended to indicate what OSD should require.

[1]OASD(MRA&L) Task Order 78-II-1, accepted by IDA on February 2, 1978. See copy of task order in Appendix B.

We also assumed that our research efforts should be directed at the creation of a capability to produce static LRA displays enabling OSD to measure the volume of logistic resources used or programmed to support logistic functions and weapon systems. Although the LRA can rightfully be regarded as an important element in a total DoD decisionmaking system, research on ways to make the LRA a more useful tool in this process must be deferred. Time simply did not permit the study of such questions as how information on the independent variables that drive logistic resource requirements could be incorporated into the LRA data base.

While it would certainly have been most desirable to have been able to identify existing or planned Service data systems that could fully support the LRA, all the LRA data requirements cannot be satisfied by such systems. In exploring ways to provide all of the required information it was necessary to consider several alternatives, including modifications to existing systems and use of statistical allocations. We assumed that when data gathering and management systems do not already exist at the primary levels, statistical allocations of gross data are legitimate lower cost substitutes for new data systems. In some important cases, we have simply presented alternatives to OSD; the OSD staff can determine what approach should be taken on the basis of their assessment of the value of the data.

Although it would have been desirable to validate the proposed systems with trial runs using real data, such testing should more properly be carried out during the implementation phase of the total program and therefore was not attempted here. Nor was any effort made to develop the specific formats that should be used for data displays; our research was intended only to define data coverage and describe the content of LRA data bases.

An overall LRA structure will be established covering all Services. Therefore, common definitions were applied to those sections of the LRA common to two or more Services. There are certain sections of the LRA that apply only to one Service; these are pointed out in our discussion of that Service.

It would be desirable eventually to develop concepts, consistent among the Services, of how to use data systems to support the LRA. However, in this study we concentrated on the currently more important task of devising ways to support the LRA based on how each Service develops its resource requirements in the PPBS process.

With regard to the data to be included in the LRA, data for all years in the period covered by the applicable FYDP should be at the same level of aggregation. The financial information used to support the LRA will be in the form of direct obligation data, by appropriation; for example, the financial data used to support the depot maintenance section of the structure will be "customer funds" to purchase depot maintenance services from industrial fund and commercial activities or to provide services directly (i.e., from organic non-IF facilities). Industrially funded producer costs and revenues will not be displayed in the initial LRA structure.

Information on funds (by appropriation) and manpower (military and civilian) will be provided for every line in the LRA structure as appropriate. One exception relates to depot maintenance. It is not meaningful to attempt to relate industrially funded manpower in the depot facilities to customer dollars used to purchase depot maintenance work by LRA structure line. Therefore, depot maintenance manpower will be shown only by organization. The logistic resources in the FYDP for the Reserve and National Guard forces also must be included in the LRA; therefore, references in this paper to operating or investment appropriation financed resources will

be assumed to cover the corresponding relevant active and reserve forces appropriated resources for each Service. Since the LRA requires display of resources by appropriation, it follows that the Services will be required to show the resources financed by reserve appropriations separately throughout the LRA.

We cannot evaluate the quality of the program data in those data systems identified to support the LRA. However, implementation of the LRA should be viewed as a necessary step toward greater logistic resource visibility in the FYDP, which can lead to improved data quality. The LRA process should entail expanded communication concerning logistic resource decisionmaking, both between OSD and the Services and within the Services. Such communication should result in improved data quality, more meaningful logistic resource programming, and more effective resource use.

C. APPROACH AND SCOPE OF RESEARCH

Our research was accomplished as follows. Using research into each Service as a basis, we developed a final proposed LRA structure which, in fact, represented the original OASD(MRA&L) structure with a limited number of proposed changes. Exhibit 1 shows this structure. It can be seen that the LRA structure includes major aggregations of resources by major logistic support functions and subordinate groupings of these resources by subfunctions, materiel categories, and work performance categories.[1]

We then identified the Service data systems that could produce the required logistic information (or indicated what alterations in systems or procedures would be necessary)

[1]Materiel categories and work performance categories are based generally on those shown in Enclosures 2 and 3, DoDI 4151.15, *Depot Maintenance Programming Policies*, November 22, 1976, as well as DoD program and budget documents.

I. LOGISTIC SUPPORT OF PEACETIME MATERIEL READINESS

A. MAINTENANCE, MODIFICATION AND TECHNICAL SUPPORT OF EQUIPMENT

1. Depot-Level Maintenance and Modification/Alteration Installation
   - a. Aircraft
     - (1) Airframe Reworks
     - (2) Engine Overhaul
     - (3) Component Repair
     - (4) Modification Installation
     - (5) Other Maintenance and Support
   - b. Ships
     - (1) Scheduled Overhaul
     - (2) Other Overhaul and Repair (RA/TA)
     - (3) Shipboard Equipment/Component Repair
     - (4) Alterations Installation (FMP)
     - (5) Conversions Installation
     - (6) Other Maintenance and Support
   - c. Missiles
     - (1) Equipment Overhaul and Repair
     - (2) Component Repair
     - (3) Modification Installation
     - (4) Other Maintenance and Support
   - d. Combat Vehicles
     - (1) Equipment Overhaul and Repair
     - (2) Component Repair
     - (3) Modification Installation
     - (4) Other Maintenance and Support
   - e. Weapons and Ordnance
   - f. Electronics and Telecommunications Equipment
   - g. Other Equipment

2. Manpower in Organic Depot Level Maintenance Activities

   (Entries in this section will show the manpower in each Service's depot maintenance facilities, by facility)

3. Sustaining Engineering and Technical Support
   - a. Aircraft
   - b. Ships
   - c. Missiles
   - d. Combat Vehicles
   - e. Weapons and Ordnance
   - f. Electronic and Telecommunications Equipment
   - g. Other Equipment

I. LOGISTIC SUPPORT OF PEACETIME MATERIEL READINESS, Cont.

4. Intermediate-Level Maintenance
   - a. Aircraft
   - b. Ships
   - c. Missiles
   - d. Combat Vehicles
   - e. Weapons and Ordnance
   - f. Electronic and Telecommunications Equipment
   - g. Other Equipment

5. Organizational/Unit-Level Maintenance
   - a. Aircraft
   - b. Ships
   - c. Missiles
   - d. Combat Vehicles
   - e. Weapons and Ordnance
   - f. Electronic and Telecommunications Equipment
   - g. Other Equipment

6. Initial Spares and Repair Parts (Procurement)
   - a. Aircraft
   - b. Ships and Shipboard Equipment
   - c. Missiles
   - d. Combat Vehicles
   - e. Weapons and Ordnance
   - f. Electronic and Telecommunications Equipment
   - g. Other Equipment

7. Replenishment Spares and Repair Parts (Procurement)
   - a. Aircraft
   - b. Ships and Shipboard Equipment
   - c. Missiles
   - d. Combat Vehicles
   - e. Weapons and Ordnance
   - f. Electronic and Telecommunications Equipment
   - g. Other Equipment

8. Modification/Conversion Hardware and Alteration Materiel (Procurement)[a]
   - a. Aircraft
     - (1) Conversion in Lieu of Procurement (CILOP)
       - (a) Service Life Extension (SLEP)
       - (b) Other (CILOP)
     - (2) Operational/Military Capability Improvements
     - (3) Safety
     - (4) Reliability and Maintainability
     - (5) Other
   - b. Ships
     - (1) Conversions (SCN-funded)
       - (a) Service Life Extension
       - (b) Other
     - (2) Alterations
       - (a) Operational/Military Capability Improvements
       - (b) Safety
       - (c) Reliability and Maintainability
   - c. Missiles
     - (1) Operational/Military Capability Improvements
     - (2) Safety
     - (3) Reliability and Maintainability
     - (4) Other
   - d. Combat Vehicles
   - e. Weapons and Ordnance
   - f. Electronics and Telecommunications
   - g. Other Equipment

B. SUPPLY SYSTEM OPERATIONS

1. Depot-Level Storage and Distribution Activities
2. Central Inventory Management Activities
3. Procurement Operations and Contract Administration Services
   - a. Central Procurement Operations
   - b. Central Contract Administration
   - c. Other Procurement Operations (Non-BOS)
4. Supply Operations
   - a. Intermediate Level
   - b. Organizational Level

C. TRANSPORTATION

1. Second Destination Transportation
   - a. Transportation
     - (1) MAC
     - (2) MSC
     - (3) Other
   - b. Terminal Services
2. Airlift Operations (MAC)
3. Sealift Operations (MSC)
4. Traffic Management and Terminals (MTMC)
5. Transportation Services
   - a. Intermediate Level
   - b. Organizational Level

D. LOGISTIC SUPPORT OF FORCE OPERATIONS AND TRAINING

1. Fuel
   - a. Aircraft
   - b. Ships
   - c. Vehicles
   - d. Other
2. Personnel Support Materiel
   - a. Subsistence
   - b. Clothing and Medical Supplies
3. Other Consumable Supplies and Materials
4. Munitions: Peacetime Operations and Training (Procurement)
   - a. Ammunition
   - b. Tactical Missiles
   - c. ASW and Other Munitions

[a] Non-add entries will be provided for all programs to show installation costs separately.

Exhibit 1. LOGISTIC RESOURCE ANNEX: OSD FUNCTIONAL CATEGORY STRUCTURE

I. LOGISTIC SUPPORT OF PEACETIME MATERIEL READINESS, Cont.

c. Missiles
   (1) Operational/Military Capability Improvements
   (2) Safety
   (3) Reliability and Maintainability
   (4) Other
d. Combat Vehicles
e. Weapons and Ordnance
f. Electronics and Telecommunications
g. Other Equipment

SUPPLY SYSTEM OPERATIONS

1. Depot-Level Storage and Distribution Activities
2. Central Inventory Management Activities
3. Procurement Operations and Contract Administration Services
   a. Central Procurement Operations
   b. Central Contract Administration
   c. Other Procurement Operations (Non-BOS)
4. Supply Operations
   a. Intermediate Level
   b. Organizational Level

TRANSPORTATION

1. Second Destination Transportation
   a. Transportation
      (1) MAC
      (2) MSC
      (3) Other
   b. Terminal Services
2. Airlift Operations (MAC)
3. Sealift Operations (MSC)
4. Traffic Management and Terminals (MTMC)
5. Transportation Services
   a. Intermediate Level
   b. Organizational Level

LOGISTIC SUPPORT OF FORCE OPERATIONS AND TRAINING

1. Fuel
   a. Aircraft
   b. Ships
   c. Vehicles
   d. Other
2. Personnel Support Materiel
   a. Subsistence
   b. Clothing and Medical Supplies
3. Other Consumable Supplies and Materials
4. Munitions: Peacetime Operations and Training (Procurement)
   a. Ammunition
   b. Tactical Missiles
   c. ASW and Other Munitions

II. LOGISTIC SUPPORT OF POST-D-DAY COMBAT SUSTAINABILITY

A. WAR RESERVE STOCKAGE

1. Munitions (Procurement)
   a. Ammunition
      (1) Ground
      (2) Air
      (3) Ship Gun
   b. Tactical Missiles
      (1) Surface-Surface
      (2) Surface-Air
      (3) Air-Air
      (4) Air-Surface
   c. Other Munitions
      (1) Sonobouys
      (2) Torpedoes and Mines
      (3) All Other Munitions
2. Aviation War Consumables (Procurement)
3. Spares and Repair Parts (Procurement)
4. Stock Fund Materiel
   a. Repair Parts
   b. Clothing
   c. Other Supplies

B. INDUSTRIAL PREPAREDNESS

1. Ammunition Production Base Investment (Procurement)
2. Other Industrial Facilities Investment (Procurement)
3. Manufacturing Technology (Procurement)
4. Industrial Preparedness Operations
   a. Layaway/Maintenance of Reserve Plants
   b. Layaway/Maintenance of Reserve IPE
   c. Industrial Preparedness Planning
   d. IPE Management and Control
   e. Manufacturing Technology (O&M-funded)

III. LOGISTICS MANAGEMENT AND SUPPORT ACTIVITIES

A. LOGISTICS MANAGEMENT HEADQUARTERS

B. LOGISTIC SUPPORT EQUIPMENT (Procurement)

1. Aircraft Logistic Support
2. Ship Logistic Support
3. Missiles Logistic Support
4. Combat Vehicles Logistic Support
5. Weapons and Ordnance Logistic Support
6. Electronics and Telecommunications Logistic Support
7. Civil Engineering Logistic Support
8. Maintenance Support Equipment
9. Supply Support Equipment
10. Logistic ADP
11. Productivity Enhancement Investment

C. OTHER CENTRAL LOGISTIC SUPPORT

1. Property Disposal
2. Inactive Equipment Storage and Maintenance
3. Other Logistics Activities

IV. INSTALLATIONS AND FACILITIES SUPPORT

A. FACILITIES CONSTRUCTION (LESS HOUSING)

1. Logistic Facilities Construction
   a. Supply and Storage Facilities
      (1) Ammunition
      (2) POL
      (3) POMCUS
      (4) Other
   b. Maintenance Facilities
2. Other Facilities Construction
   a. Administrative Facilities
   b. Community Facilities
   c. Medical Facilities
   d. R&D Facilities
   e. Operations and Training Facilities
   f. Telecommunications Facilities
   g. NATO Infrastructure
   h. Guard and Reserve Facilities
   i. Utilities and Real Estate Acquisition
   j. Air Pollution Control
   k. Water Pollution Control
   l. Nuclear Security
   m. Energy Conservation Investment
   n. Minor Construction
   o. Planning and Design
   p. Contingency
3. Personal Property Collateral Equipment
   a. Logistics Facilities Equipment
   b. Other Facilities Equipment

B. HOUSING

1. Family Housing
   a. New Construction
   b. Improvements
   c. Leasing
   d. Operation
   e. Maintenance
   f. Debt Payment
2. Troop Housing Construction

C. REAL PROPERTY MAINTENANCE ACTIVITIES

1. Maintenance and Repair
2. Minor Construction
3. Utilities Operation
4. Other Engineering Support

D. BASE OPERATIONS: OTHER SERVICES AND SUPPORT

1. Administrative Services
2. Installation Level Supply Services
3. Installation Level Maintenance Services
4. Installation Level Transportation Services
5. Installation Level Procurement Services
6. All Other Base Services

and developed a data element reference guide to document the data system support. Two types of information are included in the guide. One is that information needed to show resources by function, subfunction, materiel category or work performance category in the basic structure. Since OASD(MRA&L) had asked us to show how maintenance, modification, and technical support resources could be related to OSD-selected weapon systems in each Service, the other type of information is that needed to identify these resources by designated weapon systems.

The resources provided for this task did not permit us to perform intensive research on the Army. Furthermore, OSD limited our research on the Army to a determination of whether the General Research Corporation work would result in an Army LRA consistent with the LRAs for the other Services. Using this work and our own, we have developed preliminary recommendations on ways to establish and operate an OSD-level LRA data system. It must be emphasized, however, that these recommendations are preliminary and considerable additional work is required to complete the system.

D. IMPLEMENTATION OF THE LRA

In this paper we have confirmed the suitability of the basic LRA structure developed by OASD(MRA&L) and provided the framework for developing systems that the Services could use to produce LRAs. These LRAs could be produced in the same format for the three major updates required of the FYDP: for the POM submission, the Service budget submission, and the President's budget.

Although we have provided the basic framework, much more work needs to be done in each Service to develop implementation methods and establish the system. Nevertheless, we believe that the first LRA under these systems can reasonably be produced with the Service POM submittals in May 1979. We recognize

that this is not sufficient time to allow for development of completely automated systems. Furthermore, it may not be possible to provide all of the detailed data that would be included in a fully implemented LRA system. Service methods will have to be refined subsequent to the May 1979 submittal, but it should be possible to have the basic systems operational by that time.

Chapter II

LRA DATA CHARACTERISTICS

The data used for the OSD LRA are required to be reconcilable to data in the DoD FYDP. This means that the dollar and manpower data identified according to logistics line items in the LRA are all contained somewhere in the FYDP, but in most cases these data appear as gross totals in the FYDP, not as the detailed logistic line items required by OSD.

The fact that LRA data are essentially FYDP data identified to logistics line items below the FYDP level of detail implies two things. First, in many cases FYDP data and LRA data are expressed in the same terms. For example, both the LRA and FYDP use appropriations and fiscal year end-strengths to measure financial and manpower resources. Second, in some cases the only difference between LRA data and FYDP data is that the LRA requires measurements at lower levels of logistic detail. For example, the LRA requires identification of replenishment spares data, which generally appear in the FYDP at the appropriation budget activity level, to weapon system. The remainder of this chapter discusses the ramifications of these and other related considerations.

A. THE DEPARTMENT OF DEFENSE PPBS

The readers of this document are doubtless sufficiently familiar with the DoD PPBS that it is unnecessary to discuss the system in depth. However, some features of the system should be mentioned, as the LRA will be an important document supporting the FYDP.

It is difficult to identify unequivocally any step in the PPBS process as the initial step. The system operates continually, with planning, programming, budgeting, and resource management functions being performed at all times. As an example of this, consider the following. For any given fiscal year we might justifiably view the Program Objective Memorandum (POM) submitted by the Services in May as the document that initiates the budget part of the PPBS process. After all, the POM requires each Service and OSD to make the program decisions that lead eventually to the preparation of the annual Service budget submitted to OSD in October and to the Congress in the following January. In terms of resources, however, the POM is an annual updating document, used to show OSD three things:

(1) How resources approved for the current fiscal year are to be used based on experience since the last updating of the FYDP in January.

(2) How resource levels previously approved for the next 4 years, including the next budget year, should be revised to reflect program changes and new OSD and Service guidance.

(3) Resource requirements for the year that has been added to the Service program since the previous POM submittal.

Thus, while the POM may be considered the first step in a program and budget decision process, it is also just one of the intermediate steps in a procedure designed to make incremental changes to the last official Service statements of resource requirements. Each new requirements statement document, whether it be the POM or the annual budget, is based on the display of approved resources in the latest official FYDP. This is true even if zero-base budget methods are used.

This concept of incremental changes is important. When we consider ways to produce an LRA, and whether standard LRAs could be produced at all major stages in the PPBS process, we should keep in mind the fact that although data are displayed

at different levels of aggregation and in different arrays during the PPB cycle, a formal or informal accounting thread of data reconciliation runs through the entire process. It follows that if data displays can be prepared for one resource requirements statement (the POM or annual budget), it should be possible to prepare a comparable display for every other resource statement, provided that the proper analytical effort is applied to the task. This is true even though the information to be required in the POM is identified by OSD each year in the Consolidated Guidance and may change every year, whereas the format for the annual budget submittal is more standardized since it is based on historical OSD, OMB, and Congressional statements of data needs.

The LRA will require data on logistics more detailed than what can be found today in all POM and budget submittals. Nevertheless, once these data have been defined it should be equally possible to produce them with a POM in May or with the updates of the FYDP done in connection with the submittal of a Service Budget in October or a President's Budget in January.

1. Program Elements and Appropriations

The FYDP shows DoD resources identified according to 10 major mission or functional areas (programs) of DoD responsibility. The program elements within these 10 program areas are designed to show the resource requirements associated with specific weapon systems or with the functions required to accomplish the overall responsibilities of that area. The program elements include the resources in various appropriations for a 7-year period. The FYDP is essentially a planning document, designed to display the information needed to develop plans for future OSD missions. The document is updated by a feedback system that incorporates into it the effects on resource allocations of actual experience and changes in future plans.

The DoD appropriations show resources by type--for example, equipment or personnel. Structuring the appropriations this way permits review agencies, and especially the Congress, to consider the effect on the economy of DoD programs and to institute measures to control allocation of resources to the DoD and its components. Since the FYDP shows resources spread throughout many programs, the appropriation structure (or something similar) is necessary to show aggregate resources by category so the desired review agency functions can be performed.

When resources must be presented in two separate arrays, the data have to be reconcilable at some level of aggregation. This requirement creates the need for countless procedures to perform internal reconciliations among the data elements displayed in the two systems. While there are many cases in which prorations are required to enable data from one system to be displayed in another, most of the data can be reconciled with accounting accuracy.

Since the LRA will support the FYDP it might be assumed that one could simply extract logistics data from each program element and display them separately in the LRA. Unfortunately, in many program elements the logistic information is included in resource totals. For example, the FYDP shows total manpower end-strengths and dollars to finance the manpower for Navy F-14 squadrons in PE 24144N; however, the portion of these totals that represents logistic support manpower is not shown separately.

A further complication results from the fact that the LRA categorizes resources in terms of functions. As mentioned above, the program elements contain mixtures of functions; this is also true of the data showing resources by appropriation. For example, the Operations and Maintenance Appropriation budget shows civilian man-years and dollars required to finance those man-years, but it does not show the man-years and dollars by functions

performed by the manpower. Thus it is also impossible simply to transfer data from the appropriation displays to use in the LRA.

The system we propose to produce the Service LRAs involves the use of some data systems that support only the FYDP, others that support only appropriations documents, and others that support both. In developing our proposals, we have been careful to guard against "double-counting" resources, since the information will be derived from data systems that support different structures. Unfortunately, it is not possible to use double-entry accounting concepts to cross-check the resources displayed in the FYDP documents with those shown in the appropriations documents. Thus, we have what amounts to a single-entry system in which we pull resources from various sources and display them in an LRA; as a result, we have only a limited audit capability. We do not consider this a serious disadvantage because we believe that if the system is implemented as we propose, a comprehensive audit capability will not be required.

2. Working Capital Funds

By working capital funds we mean industrial funds and stock funds. Large amounts of DoD logistic resources are administered through working capital fund procedures. For example, depot maintenance activities are conducted using industrial fund methods for managing, budgeting, and accounting. Large volumes of consumable supplies are managed using stock fund procedures. Separate FYDP program elements show the revenues and expenses for industrial fund activities to indicate activity levels, but the FYDP does not show stock fund activities separately. Both industrial fund and stock fund activities are administered by use of budget and accounting methods.

The Logistic Resource Annex will not display revenue and expense information on working capital fund activities. Working capital fund procedures are regarded primarily as management methods used to promote more efficient operations; OASD (MRA&L) therefore does not consider it necessary to include separate data on their activities in the LRA.

B. DATA SYSTEMS

Those Service data systems that have been developed and implemented in compliance with OSD directives are reasonably uniform. For example, DoDI 4151.15, *Depot Maintenance Support Programming Policies*, and DoDH 7220.29H, *DoD Depot Maintenance and Production Reporting Handbook*, require that all Services perform about the same procedures for depot maintenance programming and accounting. Since depot maintenance is also administered using industrial fund procedures, all Services have considerable information on their depot maintenance activities. Extensive research was required to review actual Service depot maintenance programming and accounting systems, but we found that usually the data to support the LRA could be obtained from existing systems. The major problem will be in showing depot component repair costs by selected weapon systems. Proration techniques are recommended to deal with this problem.

In areas other than industrially funded depot maintenance there is less uniformity in the Service data systems. For example, DoDI 7220.20, *Expense Data Requirements*, which prescribes the minimum data requirements for reporting expenses financed from operating budgets, directs the use of DoD Elements of Expense (DoDEE) as one of the required categories for the reporting of these expenses. In implementing this directive, the Air Force has established an element of expense (AFEE) structure that is a direct expansion of the DoDEEs. This structure is the primary tool used in programming and accounting for dollars in the Air Force O&M appropriations. The Navy,

on the other hand, has a system of budget classification codes (BCCs) that are the primary tools used for programming and accounting for dollars in their O&M appropriations. These BCCs are functionally oriented and do not represent expansion of the basic DoDEE structure, so they do not relate to the DoDEEs on a one-to-one basis. Despite such differences in Service approaches, however, the existing systems can be used to develop the data required to support the LRA. (In this particular case we were able to propose use of similar methods in the Air Force and Navy to obtain many of the necessary O&M data elements.)

The ways in which the Services develop data to support the PPBS are also fairly uniform. All the Services attempt to centralize the major operations relating to the PPBS process at the level of the Service headquarters, although the degree of concentration is greater in the Air Force than in the Navy. All the Services use computer-based mathematical models to calculate at least some resource requirements in that part of the PPBS cycle that results in the preparation of the POM. However, the extent to which model outputs evolve into actual or modified control totals for elements of a final program or budget differs from Service to Service. All the Services attempt to involve field agencies in the final steps required to establish a firm program and budget for a particular fiscal year. By this time, however, most of the major decisions have been made and adjustments are at the margin.

These procedural differences all have an effect on the problem of obtaining data to produce the Service LRAs. We adopted as a guideline the premise that the process each Service uses to create the LRA should be based on that Service's methods of producing data for the PPBS process. Since there are differences from Service to Service in the extent to which PPBS data are based on field-level inputs or headquarters-developed numbers, it was not possible to create criteria for

the sources of LRA data that could be applied uniformly to all the Services.

We found that the logistic-related data systems used at levels below the Service Headquarters level are usually designed for management and accounting purposes as opposed to planning and programming. For this reason, the products of these systems normally cannot be used directly to produce a Service LRA.

Finally, we examined the systems designed to support the DoD Visibility and Management of Support Costs (VAMOSC) project. We found that the VAMOSC systems are not new data systems but methods of building on existing logistic management systems so that data can be aggregated and manipulated to produce support cost information in the categories required by the project. The VAMOSC projects have been relatively successful in using management data systems to create information useful for planning and programming from field-level data, but VAMOSC cannot be viewed as a potential contributor of basic data to the LRA. VAMOSC systems can be used to develop factors that could be useful in allocating data for support of the LRA.

C. RESOURCE ALLOCATIONS: JUDGMENT OR STATISTICAL METHODS

When dealing with a data structure the size of an LRA, it is usually safe to assume that there will be no existing data system that can provide suitable support information for certain parts of the structure. For the LRA this is true with regard to that part of the structure showing programmed resources by weapon system and, in some cases, by materiel category. The question then arises as to whether it is better to modify existing data systems or create new ones to provide the proper data. In answering this question consideration must be given to the costs of developing proration techniques to allocate resources to different structure lines as opposed to the costs of modifying existing data systems or developing new systems. The

proration techniques can depend on analyst judgment or on methods that use independent variables to measure relative resource consumption by the particular LRA categories.

Such resource allocation procedures are a low-cost substitute for comprehensive detailed data systems. When properly performed, these procedures result in approximate data values that, theoretically, would be produced accurately and absolutely by a proper detailed data system. We recommend that resource allocation procedures be used when values need not be absolute or when using a detailed data system would be too expensive. These resource allocation procedures can thus be used legitimately in many situations. They should not be viewed as inherently unsuitable, inaccurate, or worthless. Their value depends on the situation and the bases for the methods that are employed.

In DoD extensive use is made of judgment or statistical allocation to determine resource requirements in various program categories and to distribute resources into different display groupings. For example, aircraft replenishment spares requirements in the Air Force are derived in part by estimations using statistical allocations; these spares requirements are distributed among weapon systems in a similar way. This low-cost substitute for a data system is satisfactory, provided experience is continually being reviewed and independent variables frequently analyzed to ensure that the best possible methods are being employed.

In this paper we occasionally recommend the use of judgment or statistics to allocate resources to LRA lines and weapon systems. We do so only under the following conditions:

(1) A data system that can provide the desired information does not exist.

(2) Modifying existing data systems to provide the information would be inappropriate or too expensive.

(3) The information requirement does not justify creation of a new data system.

We have proposed methods to obtain resource information for all lines in the LRA structure; however, consistent with OASD(MRA&L) instructions, we propose methods by which to display only the maintenance, modification, and technical support resources by weapon system. We recognize that many of the other logistic resources can be distributed to weapon systems using analyst judgment or statistics. While we believe it would be appropriate to distribute some of the other logistic resources to weapon systems using these methods, we suggest that this is an area for further study.

D. DISTRIBUTION OF LOGISTIC SUPPORT RESOURCES BY WEAPON SYSTEM

The costs of acquiring a weapon system can be defined in a relatively straightforward manner as being a function of procurement quantities. Through analysis of learning curves and other data, reasonably accurate acquisition costs can be estimated. Direct operating costs (such as for fuel and crews) can also be estimated without great difficulty. Determining other costs, however, is more difficult.

One recurring question in defense resource analysis is to what extent can the costs of providing logistic support meaningfully be distributed to individual weapon systems. Presumably if logistic support resources can be allocated and displayed by weapon system it is possible to gain a reasonable understanding of the true total costs of acquiring, operating, and maintaining one weapon system as opposed to another. But allocation of total logistic support costs by weapon system is a difficult task, and the methods used vary depending on the purposes to be served by the costs.

One major difficulty is how to treat joint costs. Joint costs by definition are costs that cannot be identified to an individual function or product of an organization because they are incurred for general support of operations. For example, how can the costs of management and staff at an intermediate maintenance activity be distributed to the individual weapon systems being maintained in that facility? Should such an allocation be based on the number of weapon systems maintained, manhours of labor per weapon system over a given time period, or some other variable? Should complexity factors and requirements for product improvements to overcome deficiencies in some systems be considered? These are but some of the questions that arise in attempting to find a reasonable way to allocate joint costs.

The possible use of LRA cost data in force structure or weapon system trade-off analyses brings up another problem. We have been asked to show only how the Services could identify the maintenance, modification, and technical support costs associated with a selected group of weapon systems. Other costs associated with these systems, such as supply operations, transportation, or BOS, are not identified. Furthermore, the costs distributed to weapon systems include elements such as overhead, which do not necessarily vary as a direct function of the number of weapon systems of a particular type and model or class.

The cost data by weapon system in the LRA are simply a static display of selected costs for logistic support of weapon systems based on a fixed force structure and logistic support base, and on existing maintenance and supply policies and procedures. Changes in any of these variables can affect these costs by weapon system, but assessing the effect of these changes would require a separate analysis using marginal cost estimation procedures.

An additional consideration in calculating logistic support cost by weapon system relates to components. All weapon systems have certain "weapon-system peculiar" components that are not used in any other system; they also normally use some equipment that is used by other weapon systems. Clearly the cost of supplying and maintaining peculiar components should be charged to the particular weapon system. However, it may be appropriate to distribute the supply and maintenance costs of common items, perhaps on the basis of variables (such as flying hours) that could be indicators of usage rates. Thus, the Services should be able to assign the costs of peculiar and common components to weapon systems separately.

OASD(MRA&L) has requested us to distribute only the maintenance, modification, and technical support costs to weapon system supported. This is because most of these costs can be so identified whereas allocating other categories of costs in a meaningful way could be very difficult. Distributing only these costs to system supported probably results in the weapon system cost figure most useful for the kinds of analyses conducted during the annual PPBS process. Proration of other costs, such as the cost of operating major logistics headquarters or the cost of family housing on a logistic base, might be appropriate for longer range studies of Service force structures.

Thus, the costs by weapon system displayed in the LRA are the result of a compromise among costing concepts and represent an approximation of the relative costs of supporting major weapon systems.

E. DECISIONS CONCERNING THE IDENTIFICATION OF DATA TO LRA CATEGORIES

In order to produce a suitable LRA, numerous decisions must be made to determine what information should properly be included in the different LRA categories. For example, how

should we define "logistic support equipment"; what criteria should we apply to distribute resource data on spares and repair parts to materiel categories and weapon systems? In this section we will discuss the problems and issues bearing on the question of what kinds of data should be used in the LRA categories.

1. Service Appropriation Integrity

Early in our research we encountered the problem of joint consumption of resources that had been appropriated separately by the Congress for the Navy and Marine Corps. For example, Marine Corps military personnel paid through the Marine Corps Military Personnel Appropriation are permanently assigned to Navy ships and are shown in Navy PEs in the FYDP. Likewise, Navy personnel financed by Navy appropriations are assigned permanently to Headquarters of Fleet Marine Forces. The Navy has complete responsibility for central logistic support of Marine Corps aircraft and uses funds appropriated for the Navy to use for this purpose. Some Navy maintenance support is also provided for Marine Corps aircraft in the field.

This problem raised the question of whether resources should be shown in the LRA of the Service that consumes the resources, or in the LRA of the Service to which the resources are provided by the Congress through appropriations. We decided to adopt the "Service appropriation integrity" approach, and include all of the total obligational authority (TOA) of a single Service in that Service's LRA, and exclude the TOA of any other Service. The Navy is required to show the resources employed to support Marine Corps aircraft separately in its LRA; this does not violate the appropriation integrity approach because these resources are appropriated for Navy use.

By adding together the resources shown in the Navy and Marine Corps LRAs we obtain the total amount of Department of

Navy resources programmed to accomplish the various logistic functions. This amount equals the totals for logistic resources programmed within program elements of the DNFYP. However, it is not always possible to relate the resources shown in Navy or Marine Corps PEs directly to the resources shown in that Service's LRA. For example, the Marine Corps provides military manpower for employment in Navy supply depots, and these manpower plus associated MILPERS dollars are shown in PE 71111N (a Navy program element). Using the appropriation integrity approach, however, means that we show these Marine Corps manpower and dollars in the Marine Corps LRA, not the Navy LRA, because they are financed by the Marine Corps MILPERS appropriation.

Thus, our approach permits the analyst to identify quickly those resources appropriated to perform the logistic functions for the Navy and for the Marine Corps by appropriation. We believe this is desirable, since each Service has separate appropriations for all categories of funds. On the other hand, if the analyst is interested in logistic resources as displayed by program element, he can appropriately sum the data in the two Service LRAs to derive the Department of Navy totals shown in the DNFYP.

The appropriation integrity approach is most important to the Navy and Marine Corps LRAs; however, it also applies to the other Services. Some of the resources included in the Air Force and Army LRAs are shown in PEs of other Services or DoD activities in the FYDP. The amounts of such resources, however, are not large.

The use of non-add entries would make it possible to show resources in terms of both source (appropriation) and use (location of employment). We concluded that this information was not useful enough to justify the workload required to develop and display it; therefore, preparation of the LRAs will be based solely on the appropriation integrity approach.

2. Customer Dollars Versus Manpower Employed in Depot Maintenance

Section IA1 of the LRA contains the structure for the display of Service dollars used to purchase depot work (i.e., "customer" dollars) or to support work at nonindustrially funded organic facilities. The dollar resources to be displayed here are based on direct obligations, so the data in this section can be reconciled with Service appropriation data, but this section does not show all the work accomplished in a Service's organic depots. For example, funds used to purchase work performed by other Services would be included in the customer dollars shown in section IA1, but dollars representing work that the Service performs in its depot as a "producer" for other Services are not included.

Section IA2 of the LRA displays data on total military and civilian manpower employed in a Service's depot maintenance facilities. A large volume of the work performed in these facilities is for other Services and to support the Foreign Military Sales Program. Thus, only a part, although the major part, of the manpower shown in section IA2 is engaged in performing the work measured in the dollars shown in section IA1.

The bases for the entries in these two sections appear to be inconsistent; they are, however, in keeping with the requirements inherent in the appropriation integrity approach and the need to show all of a Service's logistic support resources in its LRA. The entries in section IA1 show the appropriated dollars a Service uses to purchase depot maintenance or to provide depot maintenance support in non-IF organic facilities. All manpower must be included in section IA2 as part of the Service's total authorized end-strength. Funds programmed in the MILPERS appropriations to support total military end-strengths are included here because these personnel are financed from Service appropriated funds.

Sections IA1 and IA2 must be regarded as separate and distinct categories of information on the resources committed to depot maintenance in a particular Service. It would be inappropriate to attempt to develop factor relationships between them--i.e., to relate dollars to manpower for depot maintenance work by relating data in these two sections. Information on total depot maintenance revenues and costs is available in the FYDP, and comprehensive information on customer workloads and sources of costs and revenues is available in the formats that support the annual budget submittals.

3. Criteria for Identifying Logistic Manpower Resources

Determining the proper manpower resources to show in the LRA involves important definitional problems. The conceptual problems associated with this resource area are discussed fully in Chapter IV, but some comments are appropriate here.

The LRA requires that all Service logistic civilian and military manpower be identified in terms of fiscal year end-strength data consistent with data shown in the FYDP. Industrially funded manpower data are to be shown by organization with no attempt to distribute manpower by materiel or work performance category. Direct funded manpower data are to be shown at the appropriate subfunction level. For example, manpower employed at the intermediate maintenance level will be shown by materiel category.[1] Manpower employed in procurement operations will be shown as performing central procurement operations, central contract administration, or installation procurement operations. Manpower end-strength data will not be shown by weapon system, although manpower costs will be included in the maintenance, modification, and technical support of equipment costs to be shown by selected weapon systems.

[1]For the purposes of this study, materiel categories are aircraft, ships, missiles, combat vehicles, weapons and ordnance, electronics and telecommunications equipment, and other equipment.

Logistic manpower can be identified in many ways--by job title of position occupied, by individual's job and specialty code, by logistic function performed, or by organization. The approach we recommend involves the following steps:

(1) Service manpower should be identified in terms of logistic function performed, regardless of actual job code.

(2) Manpower in organizations where the primary mission is logistic support should be identified to the functional area of the organization. For example, all assigned personnel in an intermediate maintenance squadron would be categorized as intermediate maintenance personnel, even though some people would be performing clerical, supply, or other nonmaintenance functions.

(3) For manpower in organizations where the primary mission is other than logistic support, logistics people should be identified on the basis of function performed within the organization. For example, a supply clerk in an F-15 squadron would be identified as a logistic resource and shown in the LRA organizational supply function.

This approach results in some anomalies. For example, a supply clerk in an F-15 squadron is categorized as "supply," but a supply clerk in an intermediate maintenance squadron who is performing essentially the same role is categorized as "maintenance." Furthermore, the accounting clerk in the latter squadron, who is performing a nonlogistic function, is also categorized as a maintenance resource.

The approach was adopted partially to preclude the necessity of analyzing all work actually performed by nonlogistic personnel in organizations where the primary mission is logistic support. A clerk in a maintenance squadron may be performing clerical work critical to the performance of the maintenance function and should be considered a maintenance resource. On the other hand, the supply clerk in an F-15 squadron represents the extension of a logistic capability into the operational squadron and should also be counted as a logistic resource.

Chapter IV contains more information on the treatment of manpower resources in the LRA. Each Service volume also contains an extensive discussion of manpower data systems and their relationships to the LRA.

4. Identification of Resources to Materiel Category and to Weapon Systems

The LRA requires that all logistic resources be identified according to logistic function and, if appropriate, materiel category. Some resources also must be identified as supporting weapon systems to be designated by OSD.

Logistic functions, such as depot maintenance, sustaining engineering, and supply operations, are clearly recognizable in the LRA structure. Materiel category listings occur primarily in section IA of the LRA and in a few other sections as well.

The resources to be shown by weapon system are those in section IA, "Maintenance, Modification and Technical Support of Equipment," with the exception of the manpower shown in section IA2. The costs of this manpower will be shown by weapon system but the data on manpower end-strengths will not.

As a review of Exhibit 1 reveals, it would be difficult to show many resources other than those contained in section IA by weapon system. Furthermore, OSD will require weapon system displays for only a relatively few high-priority systems. The Services do not currently have in their data bases all of the information that they will need to show the required logistic information by selected weapon system; however, in the individual Service volumes we offer suggestions as to how such data can be obtained.

5. Depot Versus Non-Depot Level Logistic Support Activities

DoDD 4151.16 defines three levels of maintenance--organizational, intermediate, and depot--for the support of "force-related" equipment. Several definitions of levels of logistic support for other logistic functions, such as supply and transportation, are discussed in various DoD directives, but there is no uniform definition of logistic levels applicable to all logistic functions.[1] Through analogy with maintenance it is possible to assume levels for the other functions.

Depot functions are relatively easily identified. They are centrally administered activities, clearly identified by program elements in the FYDP, and most of the maintenance is industrially funded in all Services. Maintenance performed by organizations assigned to operating forces is relatively easily distinguished as organizational or intermediate. Although policy differences among the Services affect the complexity of work performed at each of these two levels, it is clear that organizational logistic functions are those performed in the using organization and intermediate functions are performed by units specifically established to provide logistic support to operational units. In all Services both the operational units and the intermediate support units are shown in mission-oriented (non-BOS) program elements.

In the process of determining the best place in the LRA structure to display resources, the assignment of logistic support activities that are performed at the installation level and are programmed in the base operating support program elements was a major problem. All Services have installation level supply, maintenance, and transportation organizations, the resources for which are programmed in BOS PEs. These

[1] See DoDI 5000.8, *Glossary of Terms Used in the Areas of Financial, Supply, and Installation Management*, DoDI 7220.20, *Expense Data Requirements*, and Air Force Regulation 66-5, *Production Oriented Maintenance Organization*.

organizations are assigned to the base, and provide logistic support to all mission and nonmission organizations on the base. Within these installation logistic support organizations work is performed comparable both to that performed in an operational unit (organizational level) and that performed in a specialized logistic support organization assigned to the operational forces (intermediate level).

To resolve the question of where to display resources for various levels of support from different funding sources we propose the following approach:

(1) Show depot- or central-level support (non-BOS) resources by function and, if appropriate, by materiel category in accordance with the LRA structure, section I.

(2) For nondepot field-level support, show installation level support (BOS) resources by function in section IVD.

(3) Show other nondepot field-level (non-BOS) resources by function and, if appropriate, by materiel category in LRA Section I in either the organizational-level activities grouping or the intermediate-level activities grouping.

This approach permits logistic support resources to be distinguished first as depot or nondepot and then as BOS or non-BOS. The resources can then be displayed in the appropriate section of the LRA, with all BOS programmed resources shown in Part IV. None of the BOS programmed resources would have to be distributed to weapon systems.

By using this approach all logistic resources can be displayed in the LRA in a BOS or non-BOS category. Some functions are programmed in both BOS and non-BOS program elements; the analyst can easily identify them in the LRA and add together all of the resources for a particular function.

6. Logistic Support Equipment

One major issue in producing the Service LRAs concerns the guidelines to be used in developing and portraying information on logistic support equipment. Two specific problems are involved: first, the proper definition of logistic support equipment, and second, the proper categories in which to display logistic support equipment resources.

In defining this equipment we may identify, first, a large category of procurement resources that OSD wishes to *exclude* from coverage. To be excluded are all of the resources required to acquire and initially deploy a weapon system, except initial spares. These are items such as peculiar ground support equipment, peculiar training equipment, and publications and technical data that are not part of the "flyaway" cost of a weapon system but are included in the procurement line items in Exhibit P-1 of a Service's annual budget submission.[1] These resources are considered part of the costs of acquiring a given capability, whereas the LRA is designed primarily to show what resources are needed to support that capability during the operational phase. As mentioned, this exclusion does not apply to initial spares, which are shown in the LRA in section IA6.

Also to be excluded are resources required for replenishment spares, for the modification, conversion, and alteration of weapon systems, and for logistic support of post D-Day combat sustainability. These resources are shown in sections IA7, IA8, and II of the LRA.

Logistic support equipment therefore includes:

(1) Replacement equipment for support equipment acquired initially with the weapon system but which, for various reasons, has been lost from the Service inventory.

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[1]See Chapter 241, Section 4, "Procurement," DoD 7110-1-M, *Department of Defense Budget Guidance Manual*.

(2) Other equipment, normally procured through the Other Procurement Appropriations, that is designed to provide central, intermediate, or organizational level supply and maintenance support to weapon systems. For example, this category would include common ground equipment for aircraft and missiles, equipment to modernize depot maintenance facilities, logistics-dedicated ADP equipment, calibration equipment, productivity enhancement investment, and other equipment designed to fulfill logistic support requirements.

To be included in LRA section IIIB logistic support equipment should meet the following criteria:

(1) The equipment is financed by a procurement appropriation.

(2) It is not included on the weapon system line in the P-1.

(3) It is not shown elsewhere in the LRA.

(4) It is not assigned to perform a function as part of the operational capability of a weapon system or direct operational support system.

(5) It is designed to permit the Services to provide supply- and maintenance-type support to weapon systems.

The following categorization of logistic support equipment is most consistent with Service programming procedures:

(1) Aircraft Logistic Support Equipment

(2) Ships Logistic Support Equipment

(3) Missiles Logistic Support Equipment

(4) Combat Vehicles Logistic Support Equipment

(5) Weapons and Ordnance Logistic Support Equipment

(6) Electronics and Telecommunications Logistic Support Equipment

(7) Civil Engineering Logistic Support Equipment

(8) Maintenance Support Equipment

(9) Supply Support Equipment

(10) Logistic ADP

(11) Productivity Enhancement Investment.

No Service will use all 11 of the categories for resource displays, but the 11 groupings are necessary to allow for the inclusion of all logistic support equipment in all Services. The specific items to be included in the LRA will be determined by the Services, either independently or on the basis of directions from OSD.

7. Information on Spares and Repair Parts

The LRA structure requires that the Services show initial and replenishment spares and repair parts by materiel category and by OSD-designated weapon system. In some cases it will be relatively easy to identify spares and repair parts according to these subcategories; in others it will be impossible to do so in any meaningful way. Initial spares procured with the basic weapon system can be identified easily by both materiel category and weapon system; replenishment spares can usually be identified as to materiel category but determining the weapon system supported may be difficult as some of these spares are peculiar to one weapon system while others are used on several weapon systems. Some spares, such as some electronic equipment spares, can even be identified to more than one materiel category.

Some examples will reveal the complexities of the issue. In the Navy, SCN-financed initial outfitting costs, including spares support, for the Trident submarine can be identified easily and assigned to materiel category and to weapon system. The initial spares for the Trident ballistic missile financed by the WPN appropriation can also be readily identified. Should these latter spares be shown first in the missile materiel category and then allocated in a different display to the Trident submarine weapon system? Is the Trident a complete weapon system that includes all of the resources normally carried on the submarine, or are the missiles separate weapon systems?

While in this case a reasonably straightforward decision can be made, for other WPN-financed spares the situation is more complex. For example, the Sidewinder is used on several aircraft. Should Sidewinder initial spares be distributed among aircraft weapon systems on a statistical basis, or should these spares be shown only in the missile materiel category with no distribution to weapon system?

The most difficult spares question relates to the Other Procurement appropriations. Most of the spares financed by these appropriations can be allocated to a materiel category. For example, in the Navy Budget Activity Code BAC-01 is e titled "Ship Support Equipment" and BAC-03 is "Aviation Support Equipment," indicating by BAC title the materiel category to which the spares should be related. While BAC-02 "Communications and Electronics Equipment," would appear to be equally straightforward, this is not the case. Some BAC-02 financed items are used exclusively on ships. Should the spares for such equipment be shown in the "Ships" or the "Electronics and Telecommunications" materiel category? Identifying some spares resources to weapon system creates even more complex problems. For example, BAC-01 finances ship pumps. Ship pump spares clearly belong in the "Ships" materiel category in the LRA rather than in "Other Equipment," but should these spares, as a second step, be allocated to selected ship classes?

These examples indicate the dimensions of the problem of spares allocation. Clearly all initial and replenishment spares can be identified as to materiel category and weapon system if we adopt decision rules for their identification. However, it is probable that in some cases this would serve no useful purpose and, in fact, may be misleading if spares are merely allocated statistically for the sake of identification.

In Volumes II, III, and IV of this study we present considerable information on how spares and repair parts could be

distributed by materiel category and by weapon system in the LRA for each of the Services. In the interests of consistency and in order to have the most meaningful information we propose the following guidelines for these distributions.

a. Allocations to Materiel Category

(1) With the exception of items procured through the Other Procurement appropriation, allocate spares and repair parts on the basis of the procurement appropriation in which they are funded.

(2) If the item has been procured through the Other Procurement Appropriation, allocate spares and repair parts for support equipment that is directly identifiable to a materiel category. Exclude initial and replenishment spares for munitions.

b. Allocations to Selected Weapon Systems

(1) Allocate only spares and repair parts that have previously been distributed to the materiel category that applies to the particular weapon system. For example, in the Navy missile spares are shown in the missile materiel category, so spares for the Polaris missile would not be allocated to the submarine ship weapon system that carries the Polaris missile. On the other hand, spares for the ship support equipment financed through the Other Procurement Appropriation (BAC-01) would be a candidate for allocation to the ship class weapon system since they have previously been allocated to the ship materiel category in the LRA.

(2) Allocate spares and repair parts to a designated weapon system if those spares are financed by the same appropriation which financed the initial acquisition of the weapon system.

(3) If the spares have been allocated to the materiel category of a weapon system but procured through the Other Procurement Appropriation, allocate only those that can be directly identified to the specific weapon system. For example, spares for Trident Support Equipment can be identified to the Trident submarine.

We recognize that using the above approach means that some spares will not be identified as to weapon system supported when it is clear that the basic equipment to be supported by those

spares relates only to that weapon system. For example, some electronics and communications equipment spares could be identified to given weapon systems, but we believe the benefits derived from performing such allocations do not justify the workload involved.

F. SUMMARY

The data required for an LRA are all available in the data systems that support the DoD PPBS; however, most of these data are displayed in aggregated totals or are shown in groupings that do not provide the detail by logistic line item needed for the LRA functional or weapon system categories. Program element data, which are structured for planning purposes, are normally too highly aggregated for the LRA. Appropriation data show resources by type rather than by function.

We recommend that the LRA data be derived by extracting resource information from the various sources that support the overall PPBS process. Some of this information is structured to support the FYDP and some to support the budget, but all of it together will enable the development of the proper nonduplicative data needed to support the LRA.

The PPBS-related data systems in all of the Services have much in common. Doubtless this is because the OSD directives on planning, programming, and budgeting resources have been uniformly applied throughout DoD. (For example, the Procurement Annexes are conceptually the same in all of the Services and the data displays within them are commonly structured.) Furthermore, all of the Services operate their PPBSs on a relatively centralized basis. We were able to take advantage of these centralized concepts and uniformly structured information systems to propose consistent ways in which all of the Services could satisfy the LRA requirements.

We believe that in some circumstances it is appropriate to assign data to materiel category or weapon system based on analyst judgment or by statistical allocation. Such methods would generally apply when analysis reveals that the benefits of establishing formal data systems to produce these data do not justify the costs.

In identifying data according to LRA category we found that special problems arise in dealing with logistic manpower resources, dividing some resources between depot and nondepot categories, identifying logistic support equipment, and portraying information on spares and repair parts. In all cases we have proposed methods for dealing with these problems; most of these methods could be used by all the Services.

Chapter III

LRA FINANCIAL DATA

Logistic support is financed almost entirely from investment and operating appropriation funds. Some research and development funds are expended for logistic support projects relating to reliability and maintainability of equipment and operational resupply techniques, but none of these R&D project resources is to be shown in the LRA. The individual Services will include small amounts of BOS resources financed through the R&D appropriations in section IV of the LRA, but these are considered operating resources.

In this chapter we will discuss briefly the issues relating to producing the financial data in the LRA. These issues will be discussed more thoroughly in the volumes covering the individual Services.

A. INVESTMENT RESOURCES

Investment resources are financed by two types of appropriations, procurement and major construction. We will discuss first those resources obtained through the procurement appropriations.

1. Procurement

The LRA requires information on the following categories of logistic support resources that are provided to the Services through procurement appropriations:

(1) Initial and replenishment spares and repair parts
(2) Modification equipment and support equipment
(3) Munitions and war consumables

(4) Industrial preparedness procurement

(5) Logistic support equipment.

The planning, programming, and budgeting of procurement dollars is a highly centralized process in the Services and these resources are quite visible at the Service headquarters level. The Procurement Annex, published with each updating of the FYDP, contains up-to-date displays of line items of equipment purchased through the procurement appropriations. Additional detail is provided in budget backup forms that accompany the regular Service budget submissions. Furthermore, all Services have resource managers at the headquarters level who carefully monitor all phases of procurement resources planning and usage.

In order to produce the procurement data for the LRA it will be necessary to identify procurement appropriation line items to the LRA categories, and to show by selected weapon systems the resources required for maintenance, modification, and technical support of equipment. All of the Services show procurement resources by appropriation and by budget activity code (BAC) in their Procurement Annexes. In some cases, BACs have been established that enable identification of large groups of procurement resources to materiel categories. For example, in the Air Force, BAC-06 in the Aircraft Procurement Appropriation covers aircraft initial and replenishment spares and repair parts; this entire BAC can be allocated to the aircraft materiel category. In other cases it is necessary to examine individual line items within the BAC to determine how to assign some procurement resources to LRA materiel categories.

The Procurement Annex also shows initial spares by weapon system, so the Service FYDP data bases contain the information to permit direct identification of this category of logistic support equipment to the proper selected weapon systems. In addition, the information in the Service FYDP data bases can

usually be employed to identify the equipment required to perform modifications to particular weapon systems.

In fulfilling the requirements for procurement information in the LRA, the greatest difficulties are associated with developing data for the categories discussed below.

a. Replenishment Spares and Repair Parts Data by Weapon Systems

The Procurement Annex does not currently require that replenishment spares data be shown by individual weapon system. Furthermore, the Services are reluctant to program these resources by weapon system, since the future demand and failure rates, which affect replenishment spares requirements, are very uncertain. The Services therefore wish to be able to be very flexible in managing replenishment spares resources. Nevertheless, all of the Services can distribute these resources to selected weapon systems with a level of accuracy acceptable for LRA purposes.

Some of these distributions may have to be done using statistical techniques. This can be accomplished by performing analyses to identify the variables that appear to be the true "drivers" of requirements. Extensive research has been done on this problem in the Services, so this LRA requirement can be fulfilled. Section E of Chapter II, above, contains a more comprehensive discussion of this particular LRA requirement and how we believe it should be satisfied.

b. Logistic Support Equipment

In developing LRA data for this category of resources, the major problems are to define logistic support equipment in each Service and then to compile the necessary data on the amounts procured each year. Logistic support equipment was discussed in section E of Chapter II, above. That section

contains our recommendations on how to develop LRA data on these resources.

c. Modifications, Conversions, and Alterations

In recent years an increasing amount of the funds provided in Service procurement appropriations has been for the support of weapon system modification programs.[1] These range from multimillion-dollar programs to modernize and extend the service life of major weapon systems to relatively inexpensive programs to increase the reliability of some weapon system components. Some of these programs entail making modifications to an entire fleet of weapon systems and require several years to complete.

The equipment needed for modification programs is financed through procurement appropriations. If a program is to be accomplished by a civilian contractor, the entire program cost (including installation of the equipment) may be financed from the appropriate procurement appropriation. If the modification is to be accomplished in an organic Service facility, however, the installation costs are financed from operating appropriations.

To promote efficient funds management, Congress wishes to ensure that equipment is being procured and operating funds provided consistent with the ability of the Services to implement modification programs. Therefore review agencies, including OSD, must examine equipment and associated installation fund requirements in reasonable detail to ensure that programs are being implemented consistent with Congressional intent.

Section IA8 of the LRA has been established to provide the necessary kind of information on modification programs.

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[1]For the purposes of this section modifications will be understood to mean conversions and alterations as well.

Procurement appropriation information to complete this section is available in the Procurement Annex and budget backup forms, and from resource managers. Information on associated installation operating appropriation resources is also available from these sources and can be tailored to fit OSD requirements. Pending the development of suitable automated data systems some of this information must be prepared manually, but it can all be provided.

2. Major Construction

The LRA requires information on three categories of DoD construction programs: facilities construction other than housing, construction of family and troop housing, and minor construction. Minor construction is financed through operating appropriations and will not be considered here.

The data for major construction programs are reasonably easy to obtain. Review agencies and the Congress require considerable detail on all construction programs and the LRA categories have been designed to be consistent with the way in which construction projects are programmed. Therefore, data for LRA sections IVA and IVB can be provided readily by construction resource managers.

B. OPERATING RESOURCES

Operating resources are provided primarily through the Operations and Maintenance (O&M) and Military Personnel (MILPERS) appropriations for each Service, although relatively small amounts are also provided by DoD[1] and Research and Development Appropriations. In this section we will focus on O&M- and MILPERS-financed logistic support resources.

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[1]For family housing expenses.

1. Operations and Maintenance

The individual Service O&M appropriations finance resources that appear throughout their LRAs. One of the largest uses of O&M-financed logistic support resources is for depot maintenance. Other major uses are to finance field-level maintenance, supply and transportation requirements at all levels, personnel support materiel, and installation and facilities support.

Each Service will have to utilize several data sources to satisfy all LRA requirements for O&M data. Much of the information is directly available in the Service data bases that produce data for each updating of the FYDP, such as the NCIS/FYDP in the Navy and the F&FP in the Air Force. For example, as part of the NCIS/FYDP the Navy maintains up-to-date O&M program and budget financial information both at the Unit Identification Code (UIC) level and, by budget classification code, below the UIC level. Thus, the basic building blocks of data are available. However, in some instances the specialized nature of the LRA makes it necessary to obtain additional information from lower level data systems, and in a few cases new sources must be developed.

Generally speaking, data on centrally managed activities are available or can be developed without major system changes. To secure some field-level data in the designated categories the Services will have to secure additional detail information from the field or disaggregate information forwarded from the field. In all cases methods are available that can reasonably be used to provide the required information.

A large amount of the O&M resources is needed to pay civilian personnel who are performing logistic support functions. Chapter II, Section E, and Chapter IV, below, discuss the civilian and military manpower resource area. Manpower is also treated extensively in the individual Service volumes. These discussions taken together constitute our recommendations on

how to develop the proper operating cost information on manpower. In general, authorized manpower, civilian and military, is to be categorized by identified logistic function and (in some cases) by materiel category. Service-wide average pay and allowance rates for military manpower are applied to develop the cost data; costs for civilian personnel are included in O&M costs and are not separately identified.

2. Military Personnel

Military logistic support manpower is employed primarily in the field to perform maintenance, supply, transportation, and base operations functions. Some military manpower cost data are available in program elements that equate with LRA categories (for example, depot-level storage and distribution activities); however, in most cases it is necessary to determine the numbers of personnel performing various functions and then use average pay rates to compute costs. We recognize that this procedure introduces the possibility of error, since Service-wide averages would not necessarily apply to individual functions, but we believe these methods will produce data adequate to the purposes of the LRA.

Although military manpower need not be shown by weapon system, the costs of military manpower must be included with the other maintenance, modification, and technical support of equipment costs that will be shown by weapon system. These military manpower costs are primarily associated with intermediate- and organizational-level maintenance. We propose that these costs be obtained by identifying the manpower supporting the various weapon systems and then applying the average pay rates. In many instances it will be necessary to use statistical allocations to identify personnel by weapon system, particularly for intermediate-level maintenance activities that may support more than one weapon system.

C. SUMMARY

The procedures we recommend to obtain the financial data necessary to support the LRA are straightforward. Current Service PPBS data bases, supplemented by information from budget backup forms, can provide most of the required information. In some cases resource managers will have to provide additional detailed information and in a few instances data must be allocated using statistics or judgment.

Obtaining some lower level data covering operating resources will entail the heaviest additional workload. The largest immediate requirement is to develop suitable methods for displaying military and civilian manpower data.

Chapter IV

LRA MANPOWER DATA

A. INTRODUCTION

Civilian and military personnel programmed to provide logistic support in the Services must all be classified according to one of the logistic functions in the LRA, in order that the fiscal year end-strengths of such personnel can be displayed, as required.[1] Existing automated functional manpower data bases in the Air Force and Navy can currently satisfy this LRA requirement in part; with additional work by the Services these data bases can be adjusted to provide all of the required data.[2]

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[1]The term "logistic functions" is used in a broad sense here, referring to each of the more than 100 line items in the LRA structure. In some parts of the LRA structure manpower data are not required in the same functional detail as is required in other parts of the structure. For example, the data on manpower in "Organic Depot Maintenance Activities" (section IA2) are simply shown according to employing facility, but the data on manpower in centrally administered supply system operations (sections IB1, 2, 3a, and 3b) are shown in four different supply functional categories.

[2]OSD does not require that the functional manpower data bases in the Services that would support the LRA be automated. Each Service may choose how to develop and provide functional manpower data for the LRA. For example, as an alternative to an automated system it would be feasible, though cumbersome, to survey manually all the manpower authorization documents for each activity or unit in each Service each time the LRA is updated. These surveys would result in functional manpower classifications of authorized end-strengths. Another alternative might be a manual survey of a statistical sample of the entire population of manpower authorization documents. Still another alternative could be a set of factors for the functional contents of each authorization document. The factors could be updated every few years based on the assumption that the functional proportions would change little in the short run. It seems clear from our research that the existing automated functional manpower data bases in the Air Force and Navy provide logical and efficient alternatives for updating the LRA manpower data base three times a year. These automated data bases are designed to be internally consistent with the data shown in the FYDP and with the manpower programming processes in the Air Force and Navy.

Since similar functional manpower data bases do not exist in the Army and Marine Corps, considerable staff work may be required in these Services to fulfill the LRA requirement. The characteristics and capabilities of specific Service manpower data systems are discussed extensively in the three separate Service volumes, in Chapter VI, and Appendix A. However, it is necessary to explore here the implications for data consistency of the possible answers to questions about how to approach logistics manpower classification. Consistent answers by the Services would ensure that the OSD LRA manpower data base reflects maximum comparability between and among the manpower data bases in all four Services.

There are three such questions. First, what should be the conceptual relationship in each Service between job code classifications, which identify manpower according to skills and training, and functional classifications, which identify manpower according to logistic work performed? Second, how should jobs or functions be related to the Service organizations and activities to which the personnel are assigned? Third, how should "levels" of logistic activity, such as organizational, intermediate, and depot, relate to jobs or functions and organizations? Each of these questions may be answered in different ways, and OSD must select the ways that best satisfy OSD needs. The discussion that follows examines the most prominent and logical alternative treatments of manpower data and explores some of their implications for data consistency within and among the Services.

B. COMPLEXITY OF THE MANPOWER ISSUE

Identifying manpower according to LRA category of logistic function performed is a complex problem. There are several alternative rules that could be adopted to decide whether people should be counted as logistics personnel, and there are several distinct definitions of manpower type to which each alternative

rule can be applied. Table 1 (p. 51) lists the alternative decision rules and the manpower types, producing a matrix of alternatives. Each of the 36 entries in this 6 by 6 matrix indicates whether the adoption of a particular decision alternative would result in the inclusion or exclusion of a particular type of manpower. Before examining each decision alternative and its impact on manpower in the LRA, several conceptual assumptions upon which Table 1 is based should be made explicit in order to illustrate more clearly the complexity of the manpower issue.

The choice between classifying personnel according to job code or functional category (decision step 1) assumes that these are the only two relevant alternatives available. Our research indicates that choosing job codes would seem to provide a smaller set of logistics manpower than choosing functional categories, because there may be people with nonlogistic job codes who actually perform logistic functions. These people could conceivably be excluded by use of the job code approach but included if the functional category is used to classify manpower.

The appeal of the job code approach is that job code data already exist in automated data bases in all the Services, while functional category data bases would have to be created in the Army, the Marine Corps, and the Navy operating forces.

Whichever approach is selected, the data will still have to be assigned to the LRA functional categories. The choice in step 1 is not simply between job codes and functions; rather, it is between Service job codes--that must then be equated to LRA logistics function categories--and Service functional categories--that must then be equated to LRA logistics function categories. Fundamentally, then, the Services must provide manpower data that can be assigned to the LRA categories, and Service job codes and Service functional categories are the

two prominent alternatives available for identifying what data will be supplied.

We also assumed that the alternatives presented under decision step 2 are the only relevant ones. There are many more possible combinations and permutations than the four presented, but these other possibilities are not useful because of the manpower that they exclude from or include in logistics categories.

By reading down each of the six "manpower type" columns, it is possible to see how a particular type is treated under the various step 1 and step 2 alternatives. Reference to the table shows that primary mission personnel in logistics organizations are included in the LRA under all the alternatives and primary mission and nonprimary/nonlogistics mission personnel in nonlogistics organizations are excluded. Nonprimary/logistics mission personnel in logistics organizations are included in the LRA under all alternatives, but the relevant logistics functional categories differ depending on the step 2 alternative selected. Finally, inclusion or exclusion of the two remaining generic manpower types depends on the alternative chosen. By reading across each of the six "alternatives" rows it is possible to see how a particular alternative affects the inclusion or exclusion of manpower types from the LRA. For example, decision step 2 alternative B includes all manpower in logistics mission organizations in the LRA and excludes all manpower in nonlogistic mission organizations, while alternative A includes some but not all manpower in both logistic and nonlogistic mission organizations.

It is clear from examining Table 1 that deciding how to treat logistics manpower consistently in the LRA involves complex issues. The discussion that follows is designed to explore these issues in order to elucidate the implications of the various alternatives and enable the decisionmaker to appraise

Table 1. DECISION STEPS AND ALTERNA
INCLUDING OR EXCLUDING MA

Decision Steps and Alternatives	Remarks	Manpower Types				
		Manpower in Logistics Organizations			Manpower in N	
		PRIMARY MISSION PERSONNEL (Maintenance person in a maintenance organization)	NONPRIMARY/ LOGISTICS MISSION PERSONNEL (Supply person in a maintenance organization)	NONPRIMARY/ NONLOGISTICS MISSION PERSONNEL (Finance clerk in a maintenance organization)	PRIMARY MISSION PERSONNEL (Pilot in an F-14 squadron)	NON LOG MIS PER (Ma per in squ
DECISION STEP 1: Choose job codes or functional manpower categories	Each Service has a job code data base that identifies military personnel according to job skills and training: Billet Codes in the Navy, Military Occupational Specialty Codes in the Army and Marine Corps, and Air Force Specialty Codes. Similar codes exist for civilian personnel. Functional manpower data bases that identify manpower by the functions that they actually perform currently exist in the Navy only, for its shore activities, and in the Air Force.					
ALTERNATIVE A: Job codes	It is feasible to examine the job codes in each Service job code system, select those that are logistic, and align them to LRA functional categories. The difficulty with this job code approach is that some manpower perform logistics functions that have nothing to do with their job codes, and the result could be that they would not be counted at all in the LRA data base or that they would be identified to functions they do not actually perform. Each manpower type in the columns at the right is assumed to be identified by the job code describing that type.	INCLUDED as a maintenance resource	INCLUDED as a maintenance or a supply resource depending on the DECISION STEP 2 ALTERNATIVE selected	EITHER INCLUDED OR EXCLUDED depending on the DECISION STEP 2 ALTERNATIVE selected	EXCLUDED	EITI OR dep DEC ALTI sel
ALTERNATIVE B: Functional manpower categories	Functional categories of manpower ignores job codes and classifies people according to what they do. These classifications are designed to overcome the difficulties of job code data bases discussed above, including under-reporting of logistics categories. Each manpower type in the columns at the right is assumed to be identified by a functional category describing that type and totally disregarding the job code assigned to the manpower.	INCLUDED as a maintenance resource	INCLUDED as a maintenance or a supply resource depending on the DECISION STEP 2 ALTERNATIVE selected	EITHER INCLUDED OR EXCLUDED depending on the DECISION STEP 2 ALTERNATIVE selected	EXCLUDED	EITI OR dep DEC ALTI sel
DECISION STEP 2: Choose a set of rules for treating manpower in organizations	These decision step alternatives apply regardless of which above alternative is chosen, job codes or functional categories.					
ALTERNATIVE A: Organizational mission not considered	This alternative classifies personnel by what they do (job code or function), not where they do it. A person performing a supply function (or carrying a supply job code) performs (carries) it in any mission organization and should be identified as a supply resource in the LRA.	INCLUDED as a maintenance resource	INCLUDED as a supply resource	EXCLUDED	EXCLUDED	INCL mai rese
ALTERNATIVE B: Organizational mission governs functional LRA identification	This alternative classifies personnel not by what they do (or are assigned by job code) but by where they do it. A person in a logistic organization is classified in the LRA according to the logistic mission of the organization, regardless of what the person does or what the person's job code is.	INCLUDED as a maintenance resource	INCLUDED as a maintenance resource	INCLUDED as a maintenance resource	EXCLUDED	EXCL
ALTERNATIVE C: Organizational mission governs LRA functional identification for manpower in logistics organizations; job codes used to determine manpower functions in nonlogistics organizations	This alternative applies different rules to manpower in logistics and nonlogistics organizations. It is a hybrid of STEP 2: ALTERNATIVE A for nonlogistics mission organizations and STEP 2. ALTERNATIVE B for logistics mission organizations.	INCLUDED as a maintenance resource	INCLUDED as a maintenance resource	INCLUDED as a maintenance resource	EXCLUDED	INCL mai rese
ALTERNATIVE D: Organizational mission identifies manpower as logistics or nonlogistics, but within logistics mission organization manpower LRA functions governed by what people do (or assigned job codes)	This alternative is a modification of STEP 2. ALTERNATIVE B. It continues to exclude all manpower in nonlogistics mission organizations from the LRA. The modification is that within a logistics mission organization, manpower LRA functions are determined by what people do or by their assigned job codes, not by the logistics mission of the organization.	INCLUDED as a maintenance resource	INCLUDED as a supply resource	EXCLUDED	EXCLUDED	EXCL

Table 1. DECISION STEPS AND ALTERNATIVES FOR INCLUDING OR EXCLUDING MANPOWER IN THE LRA

ks	Manpower Types					
	Manpower in Logistics Organizations			Manpower in Nonlogistics Organizations		
	PRIMARY MISSION PERSONNEL (Maintenance person in a maintenance organizat:n)	NONPRIMARY/ LOGISTICS MISSION PERSONNEL (Supply person in a maintenance organization)	NONPRIMARY/ NONLOGISTICS MISSION PERSONNEL (Finance clerk in a maintenance organization)	PRIMARY MISSION PERSONNEL (Pilot in an F-14 squadron)	NONPRIMARY/ LOGISTICS MISSION PERSONNEL (Maintenance person in an F-14 squadron)	NONPRIMARY/ NONLOGISTICS MISSION PERSONNEL (Finance clerk in an F-14 squadron)
code data base that rsonnel according to g: Billet Codes in upational Specialty Marine Corps, and Air Similar codes exist . Functional manpower ty manpower by the tually perform cur- ry only, for its share Air Force.						
ine the job codes in system, select those align them to LRA The difficulty with is that some manpower itions that have nothing odes, and the result ld not be counted at se or that they would tions they do not h manpower type in the s assumed to be identi- scribing that type.	INCLUDED as a maintenance resource	INCLUDED as a maintenance or a supply resource depending on the DECISION STEP 2 ALTERNATIVE selected	EITHER INCLUDED OR EXCLUDED depending on the DECISION STEP 2 ALTERNATIVE selected	EXCLUDED	EITHER INCLUDED OR EXCLUDED depending on the DECISION STEP 2 ALTERNATIVE selected	EXCLUDED
of manpower ignores s people according to lassifications are e difficulties of job ed above, including istics categories. Each lumns at the right is ed by a functional cate- ype and totally disre- signed to the manpower.	INCLUDED as a maintenance resource	INCLUDED as a maintenance or a supply resource depending on the DECISION STEP 2 ALTERNATIVE selected	EITHER INCLUDED OR EXCLUDED depending on the DECISION STEP 2 ALTERNATIVE selected	EXCLUDED	EITHER INCLUDED OR EXCLUDED depending on the DECISION STEP 2 ALTERNATIVE selected	EXCLUDED
ternatives apply regard- ternative is chosen, job tegories.						
ifies personnel by what unction), not where they rming a supply function Job code) performs sion organization and a supply resource in	INCLUDED as a maintenance resource	INCLUDED as a supply resource	EXCLUDED	EXCLUDED	INCLUDED as a maintenance resource	EXCLUDED
ifies personnel not by signed by job code) but person in a logistic fied in the LRA according of the organization, person does or what the	INCLUDED as a maintenance resource	INCLUDED as a maintenance resource	INCLUDED as a maintenance resource	EXCLUDED	EXCLUDED	EXCLUDED
s different rules to man- nonlogistics organizations. 2: ALTERNATIVE A for anizations and STEP 2: istics mission organizations.	INCLUDED as a maintenance resource	INCLUDED as a maintenance resource	INCLUDED as a maintenance resource	EXCLUDED	INCLUDED as a maintenance resource	EXCLUDED
odification of STEP 2: tinues to exclude all man- mission organizations from tion is that within a logis- an, manpower LRA functions people do or by their by the logistics mission	INCLUDED as a maintenance resource	INCLUDED as a supply resource	EXCLUDED	EXCLUDED	EXCLUDED	EXCLUDED

each one. The reader may find it helpful to refer to the table during the course of this discussion.

C. JOB CODE VERSUS FUNCTIONAL MANPOWER CATEGORIES

The first decision step shown in Table 1 is to choose between use of job codes or functional manpower categories to determine the data population from which the LRA manpower data will be drawn. We recommend alternative B, use of the functional manpower categories.

Each Service has a job code classification system by which military personnel are categorized according to skills and training.[1] The Service data bases contain manpower authorizations in terms of these codes; these could be used as sources for the manpower data to be displayed in the LRA. The problem with using these job codes is that job skill identification is not necessarily the same as logistic function identification. Many personnel performing logistic support functions may be identified by job codes that do not identify the actual functions they perform, and vice versa. The same is true of civilian personnel job code classifications. The conclusion is that by themselves job code classifications cannot be used to provide a complete measurement of the manpower end-strengths programmed for logistic support in the Services.

The following example illustrates the limitations of using job code classifications. There is a civilian job category called "shipfitter" that is applied to certain personnel in Naval shipyards, and it is reasonable to assume that these personnel would be included as ship depot maintenance personnel if job codes were used to provide the LRA manpower data. The shipyards also employ civilian clerks and microphotographers who carry job codes that identify them as clerks

[1]These codes are Billet Codes (Navy), Military Occupational Specialty Codes (Army and Marine Corps), and Air Force Specialty Codes.

and microphotographers. Use of job codes to obtain LRA manpower data would not capture these personnel as fitting into any logistic category.

It is of course legitimate to ask whether clerks and microphotographers at shipyards should be included as maintenance personnel, which is really part of the broader question of whether those resources (both manpower and dollars) supporting overhead functions at logistics activities ought to be included in the LRA at all. Two considerations are relevant. In regard to the broad question, if the LRA is intended to capture the total resources required to perform a logistics function, then logically the resources needed for overhead activities ought to be included. In regard to the particular personnel in question, the Navy's own functional manpower data base for the shore activities categorizes some clerks and microphotographers as "ship repair" personnel.[1]

Our research indicates that simply sorting job titles into LRA categories would seriously understate the amount of manpower resources programmed for logistic support in the Services, and as a result we do not recommend such an approach to obtaining the manpower data base for the LRA. However, this does not preclude the possibility that in combination with other categories of data, job code data may be useful for some portions of the LRA. This possibility is discussed later in this chapter.

The LRA requirement for manpower data can be met by categorizing manpower into logistic functional categories on the basis of other criteria. To do so consistently within each

[1]The term "shore activities" is the current terminology used for those activities of the Navy not assigned to the operating forces and not part of the executive apparatus of the Department of the Navy. These shore activities may also be referred to as "field activities." The term "shore establishment" is no longer in use. See OPNAVINST 1000.16D, *Manual of Navy Officer and Enlisted Manpower, Policies and Procedures*, July 30, 1977.

Service and between Services requires consideration of how manpower are categorized within logistic and nonlogistic organizations, and how levels of logistic activity are defined.

D. ALTERNATIVE TREATMENTS OF FUNCTIONS IN ORGANIZATIONS

Decision step 2 concerns how to treat manpower functions in logistics and nonlogistics organizations. There are several alternatives, which are applicable regardless of which alternative is chosen in decision step 1.[1]

1. Alternative A

The first alternative is to identify all personnel by the duties they perform and ignore the function of the organization within which they operate. This approach considers that a logistic function is defined by what a person does, not by where he does it. Adopting this approach would mean that an individual performing a supply function in a maintenance activity would be classified as a supply resource, not a maintenance

[1]Most of the alternatives in Table 1 show some nonlogistic job categories included in the LRA as logistics resources. For example, decision step 2 alternative C results in a finance clerk in a maintenance organization being included as a maintenance resource. This suggests a potential problem: double counting manpower resources identified to logistics functions in the LRA and the same resources identified to nonlogistics functions in other resource aggregations. One means for dealing with this would be to enter nonlogistics mission personnel performing logistics functions as non-add entries in the LRA. Such an identification would permit analysts to recognize explicitly the presence of nonlogistics mission personnel in the manpower resources for a given LRA category. However, we feel this is not necessary. The FYDP Procurement Annex currently displays all Service procurement resources in various categories, and the LRA will display many of these same procurement resources, but there is no plan to show these resources in the LRA as non-add entries just because they are already included in the Procurement Annex. It is assumed that analysts recognize that the Procurement Annex is one subset of FYDP resources and that the LRA is a different subset. Overlapping coverage of resources by the two subsets is not a problem because the subsets are not designed or intended to be additive. A similar assumption made about manpower resources eliminates the requirement for non-add manpower entries in the LRA, even though these manpower could be shown in other resource subsets.

resource. Similarly, a person performing a supply function in an operating F-14 squadron would be classified as a supply resource and therefore not excluded from the LRA just because the supply function is performed in an operating unit instead of a logistics unit.

One argument in favor of alternative A is that it offers a means by which to treat resources supporting the operating and logistic activities in each Service consistently. An LRA manpower data base developed in accordance with this alternative would contain all the Service manpower resources identified as supporting each logistic function and would show them in that functional category in the LRA; for example, all supply personnel, wherever they perform their supply functions, would be identified to the supply categories in the LRA. This would not be true were some of the alternatives discussed below adopted.

One difficulty with alternative A is that the current LRA structure is inconsistent with the approach. LRA section IA2, "Organic Depot Level Maintenance Activities," requires the display of total manpower resources by organization, not function. This section is part of the maintenance functional category of the LRA. Were alternative A adopted, only those personnel performing actual hands-on maintenance at the depot maintenance facilities listed would be counted and displayed here. Needless to say, depot maintenance facilities include manpower performing supply and other nonmaintenance activities. However, using a data base constructed by identifying manpower according to function would mean that these other personnel would be displayed in the functional category conforming to the function they performed. Supply manpower in a depot maintenance organization, for example, would be identified to the LRA supply function. Furthermore, those supply personnel engaged in work that directly supported the depot maintenance activities would probably be shown as organizational-level supply manpower,

since manpower performing central supply activities are shown in PEs 71111, 71112, and 71113, and personnel who provide direct support for depot maintenance work of course would not fit in these PEs.[1] If OSD deemed it desirable to be able to see both the function performed by the manpower and the total manpower in high-priority organizations, such as depot maintenance facilities, it would be feasible to enter the manpower data as "add" in one part of the LRA and as "non-add" in another part. Since such multiple displays of manpower resources increase both the complexity and size of the manpower data base however, they are not recommended.

2. Alternative B

A second alternative is to identify all personnel according to the functional mission of the organization in which they work regardless of their actual duties. This is the opposite of alternative A. A person performing a supply function in a maintenance organization would be classified as a maintenance resource, while a person performing maintenance in an operational F-14 squadron would be classified as an operational resource and not included in the LRA at all.

Strict application of this method would mean that the mission of the organization would determine the functional classification of the manpower. If an organization had multiple missions, total manpower would have to be allocated to each mission function, perhaps on the basis of the proportion of time spent on each mission.

Using this second alternative would produce an LRA manpower data base that understated the manpower resources programmed for logistics, since those manpower performing logistics functions in operational units would be excluded from the

[1]PE 71111, "Supply Depots/Operations (Non-IF)"; PE 71112, "Inventory Control Point Operations"; PE 71113, "Procurement Operations."

LRA. Another result of using this alternative would be that all resources supporting the same function would not be classified the same way. All manpower resources performing supply functions, for example, would not be classified as supply personnel and be shown in the supply logistic category in the LRA. Some supply personnel would be classed as maintenance personnel because they work in maintenance mission organizations.

The advantage of this alternative is that it focuses attention on mission capabilities and creates an LRA data base oriented to showing the mission resources required to perform logistic missions, regardless of whether the manpower involved are hands-on mission personnel or overhead personnel who support the hands-on workers.

3. Alternative C

Alternative C is essentially a combination of the first two alternatives. Total manpower in logistic mission organizations would be classified according to the function that corresponds to the organization mission, consistent with the treatment discussed as alternative B. (For example, all personnel in a depot maintenance organization would be classified as depot maintenance.) However, the same rule would not be applied to nonlogistic mission organizations. The logistic personnel in these organizations such as the maintenance personnel in an F-14 squadron, would be identified according to their actual function. This is consistent with the treatment discussed as alternative A.

Adopting this third alternative would mean that the data in the LRA manpower data base would not understate programmed logistic manpower resources since logistic resources in nonlogistic organizations would be included. However, the user would have to be sure he understood what the data in the various

LRA categories represented. For example, the manpower identified in the supply functional category in the LRA would represent all personnel in supply mission organizations plus all personnel in nonlogistic mission organizations identified as working in a supply function. But supply personnel in non-supply logistic organizations, such as a maintenance facility, would not be identified in the LRA as supply manpower.

The process of creating a data base according to this third alternative would require two discrete steps: (1) Categorize manpower in logistic mission organizations according to the logistic function equivalent to the mission; (2) Categorize logistic personnel in nonlogistic mission organizations according to the logistic function performed. It would be possible to perform this second step for the operational organizations by using job code data. This would exclude from the LRA data base a person with a clerk's job code who performs maintenance record-keeping in an operational organization, but it would minimize the requirements for functional identification of manpower in each Service. Instead of having to categorize the logistic functions performed in nonlogistic mission organizations, the Services could extract the necessary data from their automated job code data bases. The drawback of using job codes to perform this step is that all manpower performing the same function would not be included in a Service's LRA manpower data base. Clerks and other nonlogistic job-coded personnel in logistic mission organizations would be included in the LRA data base as a result of the first step of alternative C, but clerks and other nonlogistic job-coded personnel in nonlogistic organizations would be excluded as a result of the second step--even if they were performing logistic functions.

4. Alternative D

Alternative D is a modification of alternative B. Alternative B identifies all manpower in a logistic mission organization to the function equivalent to the mission, and excludes all manpower in operational units. Alternative D is to exclude manpower in nonlogistic mission organizations from the LRA, but to identify manpower in logistic mission organizations according to function performed, not organization mission. For example, adopting alternative D would mean that supply manpower in a depot maintenance organization would be identified in the LRA as performing a supply function, not a depot maintenance function.

5. Recommended Approach

We recommend that decision step 1 alternative B and decision step 2 alternative C be adopted. This is the approach used in our volumes on the Navy, Air Force, and Marine Corps LRAs. A similar approach was used by GRC, in its work on the Army (see Chapter VI).

E. LEVELS OF LOGISTIC ACTIVITY

It is also necessary to consider how logistic activity at different levels will be treated in the LRA. Maintenance, supply system operations, transportation, and base operations all involve levels of support--organizational, intermediate, depot, and base. The DoD definitions of maintenance levels for operating forces given in JCS Publication 1 (*Dictionary of Military and Associated Terms*) are:

> [Depot maintenance is] that maintenance performed on materiel requiring major overhaul or a complete rebuild of parts, assemblies, subassemblies, and end items, including the manufacture of parts, modifications, testing, and reclamation as required....

> [Intermediate maintenance, also called field maintenance, is] that maintenance which is the responsibility of and performed by designated intermediate maintenance activities for direct support of using organizations....
>
> [Organizational maintenance is] that maintenance which is the responsibility of and is performed by a using organization on its assigned equipment....

Similar definitions are applied to levels of supply and transportation activity, where depot-level work involves organizations identified as depot level, organizational-level work involves support actions taken by a using organization on its own equipment or materials, and intermediate-level work is the residual between depot and organizational level.

These definitions mix two parameters: where an action is taken and the type of work performed. If location is to be used as the factor determining logistic level, then some inconsistencies are created. For example, if all maintenance work at a depot is classed as depot maintenance, at what level is maintenance performed on a depot's own vehicles to be classed? According to the work-performed definition, this latter activity could be classified as organizational maintenance since it is performed on the depot's own assigned equipment.[1] This is important because the way in which levels of logistic activity are defined can influence the selection of a method of treating functions in organizations. Two alternative ways of defining levels of logistics should be considered.

1. DoD Definition

The first alternative is to adopt DoD's approach and define logistic level by both where the activity occurs and what is

[1]Since this activity is performed in the depot and the cost is included in the overhead rates, we have concluded that it should be considered depot work.

done. This does not solve the difficulty of how to classify user maintenance performed on organic equipment at a depot maintenance facility. All maintenance performed in support of the depot maintenance mission is depot level, and all user maintenance at the depot is organizational maintenance. Thus, adopting this definition essentially means that mission-related logistic activity should be classified according to the stated mission level, while non-mission-related logistic activity should be classified according to whether it is at the user level or beyond the user level.

Consistent application of such a definition would cause classification problems if functions in organizations were to be identified such that all logistic functions were to be mission-determined. For example, alternative treatments B and C, above, classify all manpower at a depot maintenance facility as depot maintenance resources. But if we use this definition of levels, only those maintenance resources actually performing the depot maintenance mission would be identified as depot maintenance. User maintenance resources would be identified as organizational maintenance resources.

2. Depot/Nondepot Definition

A second alternative is to define logistic activity as depot or nondepot; within the nondepot category to identify resource activities as at BOS or non-BOS levels; and within non-BOS to identify resource activities as at organizational or intermediate levels. This definition has the virtue of separating BOS and non-BOS resources, which the DoD definition does not. We recommend use of this definition, and it has been incorporated into the modifications that we have made in the list of logistics categories shown in Exhibit 1.[1]

[1]See also the discussion of depot versus nondepot level logistic support activities in Section E5, Chapter II.

F. SUMMARY

The conceptual issues surrounding creation of a data base from which to draw manpower resources for display in the LRA are complex. Table 1 shows the most reasonable alternative ways of dealing with these issues. The LRA data base we developed is based on each Service categorizing manpower resources according to logistics functions that can be equated to the LRA logistics functions (decision step 1 alternative B). Categorizing by job code would result in insufficient coverage of relevant logistic manpower. Given that this method of functional manpower classification is adopted, we recommend that the organization mission be used to govern the functional identification of manpower in logistics organizations but not of manpower in nonlogistics organizations (decision step 2 alternative C). To classify all the manpower in a nonlogistics mission organization by the mission function of the organization would exclude considerable logistic manpower resources from the LRA. Alternative C recommends recording non-primary-mission people in nonlogistics organizations who are performing logistics functions by the actual logistics function performed. This conceptual approach will provide a comprehensive manpower data subset that includes all of the people performing logistics functions as defined by the LRA categories and identified by the Services.

Chapter V

THE LOGISTIC RESOURCE ANNEX AND THE VISIBILITY AND MANAGEMENT OF SUPPORT COSTS PROGRAM

The OSD Visibility and Management of Support Costs (VAMOSC) program is designed to establish management information systems (MISs) in the Services that identify operating and support (O&S) costs by weapon system. The OSD LRA, for which guidelines are presented in this study, is designed to establish an OSD-level data base that identifies the logistic resources in the FYDP, and some of these resources are further identified by weapon system. Because some of the VAMOSC O&S cost categories are similar to some of the logistics line items in the LRA, we examine here the similarities and differences between VAMOSC and the LRA to determine whether the two systems are in any way duplicative.

On the basis of our comparison of the two systems, we conclude that although some duplication exists, the differences are substantial. Because of its narrower scope in terms of showing logistics categories, fiscal years, and manpower end-strengths, VAMOSC is not a substitute for the LRA. Differences also exist with respect to which costs are identified for the weapon systems and with respect to the reconciliation of data to the data in the FYDP data base.

A. THE BACKGROUND OF VAMOSC

In January 1974, the Deputy Secretary of Defense established an OSD VAMOSC task group to review existing Service data systems capable of providing O&S cost data for the Service VAMOSC MISs desired by OSD. In FY 75, OSD directed the Services to "develop and implement a cost-effective system to

identify maintenance and operations costs by weapon system."[1] As explained in supporting OSD documentation, meeting this requirement would necessitate gathering data at two different levels of detail--the weapon system level for total variable operating and support costs, and the subsystem level for maintenance costs.[2] The weapon system level VAMOSC data systems are called Total Support Systems (TSSs), and the subsystem level systems are called Maintenance Subsystems (MSs).

The degree to which the Services have implemented the VAMOSC program varies. The Navy has developed TSS and MS systems for aircraft and ships.[3] The Air Force has developed a TSS for aircraft and is still working on an aircraft MS. The Army is discussing aircraft TSS and MS systems with OSD, but has not yet implemented these systems to satisfy the requirement. None of the Services has extended the VAMOSC requirement to other weapon systems, such as tanks or missiles.

Currently, OSD is examining the status of the VAMOSC program in each Service to determine whether changes in existing and planned VAMOSC MISs would satisfy OSD requirements more fully. An example of the questions being considered is the question of coordinating treatment of base O&S costs between the Navy TSS, which excludes them, and the Air Force TSS, which includes them.

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[1]Deputy Secretary of Defense memorandum, *Visibility and Management of Support Costs* (MBO 9-2), October 16, 1975, and enclosure, *DoD Requirements for Visibility and Management of Support Costs*, August 1975.

[2]For aircraft, the "weapon system level" refers to mission/design/series in the Air Force and to type/model/series in the Navy. Aircraft subsystems refer to five-digit Work Unit Code level of detail defined in MIL-STD-780E (AS), December 1, 1975, *Military Standard Work Unit Codes*.

[3]Navy aircraft TSS and MS data include Marine Corps aircraft. At this time there are no plans for the Marine Corps to implement VAMOSC for tanks or missiles.

Because changes in Service VAMOSC MISs are still possible, we cannot make definitive statements about the VAMOSC program. However, it is possible to compare the implemented VAMOSC systems with the proposed LRA in terms of the logistics, operating, and support cost categories in which these systems require data. In order to provide as broad a basis for comparison as possible, the implemented Navy and Air Force TSS aircraft systems are compared with the LRA.[1] The VAMOSC MS systems are not directly comparable to the LRA because the LRA does not require data to be reported at the subsystem (five-digit work unit code) level of detail, so the Service MSs are not examined.

B. TERMINOLOGY

The LRA is designed to capture logistics costs; some are identified by weapon systems and some are not. VAMOSC TSSs are designed to capture operating and support costs, and all of these costs are identified by weapon systems. The types of costs to which these labels--logistics, operating, support--are applied are not necessarily mutually exclusive, so one must be careful in using them simultaneously to describe and compare alternative arrays of costs like VAMOSC and the LRA.

For example, aircraft fuel is classed as an operating cost (not a support cost) in the VAMOSC TSSs, but it is a logistics cost in the LRA. Can we therefore unequivocably state that the LRA includes only logistics costs and not operating costs, or that the TSSs include only operating and support costs and not logistics costs? The answer depends on how the terms operating, support, and logistics are defined, and precise definitions vary with the different requirements of those using

[1]The official name of the Navy TSS for aircraft, which includes Marine Corps aircraft, is the "Naval Aviation Logistics Command-Operating and Support/Visibility and Management of Support Cost Total Support System." The official name of the Air Force TSS for aircraft is the "Operating and Support Cost Estimating Report" (OSCER) system.

the data. These terms can be defined precisely only by the specific cost categories that are included for consideration of a given issue. Alternative definitions of costs are useful only if the delineation of included and excluded data categories is precise.

Tables 2 and 3 compare the LRA logistics data elements with the operating and support data elements in the Navy aircraft TSS and Air Force OSCER. By examining Table 2 it is possible to determine what data elements are contained in the LRA, whether they are included in VAMOSC, and if so, how they are identified. Table 3 shows the line items in the Navy aircraft TSS and the Air Force OSCER and how these VAMOSC line items are treated in the LRA--as costs not related to weapon systems, costs related to weapon systems, costs related to materiel category, and costs not included in the LRA at all.

Our research and the information highlighted by the comparisons summarized in Tables 2 and 3 have enabled us to develop definitions of operating, support, and logistics costs as they apply to VAMOSC TSSs and the LRA.

Operating costs are those costs incurred in the using organization that are associated with employing the weapon system in its intended role. Examples are aircrew pay and allowances, operational unit command, administration, operations, and security, and aircraft petroleum, oil, and lubricants.[1]

Support costs are those costs incurred in the using organization and in support activities that are associated with maintenance, supply, and base operating support of weapon systems. These costs include all costs, except for the costs defined above as operating costs, that are incurred to enable the using organization to employ a weapon system in its intended role.

[1]Costs associated with maintenance and supply support, even when provided by personnel assigned to the using organization, are excluded.

Table 2. C
C

LRA LOGISTICS CATEGORIES[a]	SIMILAR CATEGORY I OPERATING COST, SU NAVY TSS
I. LOGISTIC SUPPORT OF PEACETIME MATERIEL READINESS	Not included
A. MAINTENANCE, MODIFICATION AND TECHNICAL SUPPORT OF EQUIPMENT	Some elements included (see bel
1. Depot-Level Maintenance and Modification/Alteration Installation	Support Cost
a. Aircraft[a]	Support cost--shown in eight ca (1) Aircraft Intra-DoD; (2) Air Commercial: (3) Engine Intra-Do (4) Engine Commercial; (5) Comp Intra-DoD; (6) Components Comme (7) Other Miscellaneous; (8) Ot Engineering Support
b. Ships	Included as support cost in pla Navy Ships TSS
c. Missiles	
d. Combat Vehicles	
e. Weapons and Ordnance	Not applicable
f. Electronics and Telecommunications Equipment	
g. Other Equipment	
2. Manpower in Navy (Air Force) Organic Depot Maintenance Facilities	Manpower end strengths not incl
3. Sustaining Engineering and Technical Support	Support costs--included as sepa items for Naval Engineering and Support (NETS), Contractor Engi and Technical Support (CETS), a Publications
4. Intermediate-Level Maintenance[a]	Support costs--in Military Pers Maintenance Supplies line items
5. Organization/Unit-Level Maintenance	All organizational personnel in line items: (1) Organizational (2) Fleet Readiness Squadron Pe a result, operating and support cannot be separately identified supplies shown in a separate li
6. Initial Spares and Repair Parts (Procurement)	Not included
7. Replenishment Spares and Repair Parts (Procurement)	Included as support cost in a s item, "Replacement Reparables"
8. Modification/Conversion Hardware and Alteration Materiel (Procurement)	Included as Support Cost in a s item "Modifications"

[a]The information applies to all subcategories unless otherwise noted. For a full list of subcategories, see Exhibit 1 and Service vol

Table 2. COMPARISON OF LRA LOGISTICS DATA CATEGORIES WITH CATEGORIES IN NAVY AND AIR FORCE VAMOSC SYSTEMS

	SIMILAR CATEGORY INCLUDED IN NAVY AND AIR FORCE VAMOSC SYSTEMS AS OPERATING COST, SUPPORT COST, COMBINED O&S COST, OR NOT INCLUDED	
	NAVY TSS	AIR FORCE OSCER
	Not included	Not included
	Some elements included (see below)	Some elements included (see below)
ation	Support Cost	Support cost
	Support cost--shown in eight categories: (1) Aircraft Intra-DoD; (2) Aircraft Commercial; (3) Engine Intra-DoD; (4) Engine Commercial; (5) Components Intra-DoD; (6) Components Commercial; (7) Other Miscellaneous; (8) Other Engineering Support	Support Cost--shown in four categories: (1) Airframe Maintenance and Modifications; (2) Engines; (3) Avionics; (4) Other
	Included as support cost in planned Navy Ships TSS	Not applicable
	Not applicable	Not applicable
ilities	Manpower end strengths not included	Manpower end-strengths not included
	Support costs--included as separate line items for Naval Engineering and Technical Support (NETS), Contractor Engineering and Technical Support (CETS), and Publications	Not included
	Support costs--in Military Personnel and Maintenance Supplies line items	Support Costs--in a subcategory "Below Depot Maintenance" with six line items: (1) Chief; (2) Avionics; (3) Consolidated; (4) Field; (5) Munitions/Airborne Missiles; (6) Organizational
	All organizational personnel included in two line items: (1) Organizational Personnel; (2) Fleet Readiness Squadron Personnel. As a result, operating and support personnel cannot be separately identified. Maintenance supplies shown in a separate line item	See above
	Not included	Not included
	Included as support cost in a single line item, "Replacement Reparables"	Included as support costs in a single line item, "Rep Spares Replacement"
	Included as Support Cost in a single line item "Modifications"	Included as Support Costs in a single line item, "Mod Kits/Materiel"

list of subcategories, see Exhibit 1 and Service volumes.

2

LRA LOGISTICS CATEGORIES[a]	SIMILAR CAT OPERATING C NAVY TSS
B. SUPPLY SYSTEM OPERATIONS	Not included
1. Depot-Level Storage and Distribution Activities	Not included
2. Central Inventory Management Activities	Not included
3. Procurement Operations and Contract Administration Services	Not included
4. Supply Operations	Not included
C. TRANSPORTATION	Not included
1. Second Destination Transportation	Not included
2. Airlift Operations (MAC)	Not included
3. Sealift Operations (MSC)	Not included
4. Traffic Management and Command (MTMC)	Not included
5. Transportation Services	Not included
D. LOGISTIC SUPPORT OF FORCE OPERATIONS AND TRAINING	
1. Fuel	Included as operating cost i items: (1) Organizational P (2) Fleet Readiness Squadron
2. Personnel Support Materiel	Partially included as operat below
a. Subsistence	Not included
b. Clothing and Medical Supplies	Included as operating cost
3. Other Consumable Supplies and Materials	
4. Munitions: Peacetime Operations and Training (Procurement)	Included as operating cost f "Training Expendable Stores" cost for Fleet Readiness Squ Expendable Stores"

[a]The information applies to all subcategories unless otherwise noted. For a full list of subcategories, see Exhibit 1 and Servi

Table 2. Continued

SIMILAR CATEGORY INCLUDED IN NAVY AND AIR FORCE VAMOSC SYSTEMS AS OPERATING COST, SUPPORT COST, COMBINED O&S COST, OR NOT INCLUDED	
NAVY TSS	AIR FORCE OSCER
Not included	Some elements included as shown below
Not included	Included as support cost
Not included	Included as support cost
Not included	Included as single "Procurement Activities" line item support cost
Not included	OSCER includes below depot maintenance supply costs in the base operations line items
Not included	
Not included	Included as a single "Second Destination Transportation" line item support cost
Not included	Not included
Not included	Not included
Not included	Not included
Not included	OSCER includes below depot maintenance transportation costs in the base operations line items
Included as operating cost in two line items: (1) Organizational POL Costs; (2) Fleet Readiness Squadrons POL Costs	Included as operating cost
Partially included as operating costs shown below	Not included
Not included	Not included
Included as operating cost	Not included
Included as operating cost for organizational "Training Expendable Stores" and as support cost for Fleet Readiness Squadrons "Training Expendable Stores"	Included as support costs in two categories: (1) Training Airborne Missile; (2) Training Munitions

ubcategories, see Exhibit 1 and Service volumes.

LRA LOGISTICS CATEGORIES[a]	SIMILAR CATEGOR OPERATING COST, NAVY TSS
II. LOGISTIC SUPPORT OF POST D-DAY COMBAT SUSTAINABILITY	
A. WAR RESERVE STOCKAGE	Not included
B. INDUSTRIAL PREPAREDNESS	Not included
III. LOGISTICS MANAGEMENT AND SUPPORT ACTIVITIES	Not included
A. LOGISTICS MANAGEMENT HEADQUARTERS	Not included
B. LOGISTIC SUPPORT EQUIPMENT (PROCUREMENT)	
1. Aircraft Logistic Support 2. Ship Logistic Support 3. Missiles Logistic Support 4. Combat Vehicles Logistic Support 5. Weapons and Ordnance Logistic Support 6. Electronics and Telecommunications Logistic Support 7. Civil Engineering Logistic Support 8. Maintenance Support Equipment 9. Supply Support Equipment 10. Logistics ADP 11. Productivity Enhancement Investment	Not included
C. OTHER CENTRAL LOGISTIC SUPPORT	Not included
IV. INSTALLATIONS AND FACILITIES SUPPORT	
A. FACILITIES CONSTRUCTION (LESS HOUSING)	Not included
B. HOUSING	Not included
C. REAL PROPERTY MAINTENANCE	Not included
D. BASE OPERATIONS: OTHER SERVICES AND SUPPORT	Not included

[a]The information applies to all subcategories unless otherwise noted. For a full list of subcategories, see Exhibit 1 and S

Table 2. Continued

SIMILAR CATEGORY INCLUDED IN NAVY AND AIR FORCE VAMOSC SYSTEMS AS OPERATING COST, SUPPORT COST, COMBINED O&S COST, OR NOT INCLUDED	
NAVY TSS	AIR FORCE OSCER
t included	Not included
t included	Not included
t included	Some elements included as support cost--see below
t included	Not included
t included	Some equipment may be included in Ground Support Equipment line item as support cost
t included	Not included
t included	Not included
t included	Not included
t included	Included as support cost in three Real Property Maintenance line items, one each for the Major Force Program Support PE, Major Force Program 7, and Major Force Program 8
t included	Included as six support cost line items: three for Base Ops and three for Communications in the Major Force Program Support PE, Major Force Program 7, and Major Force Program 8

f subcategories, see Exhibit 1 and Service volumes.

Table 3. TREATMENT IN LRA OF COSTS IN TSS AND OSCER CATEGORIES

TSS Cost Category	Treatment of Costs in LRA
ORGANIZATIONAL COSTS[a]	
Military Personnel[b]	Related to weapon system and materiel category
Civilian Personnel[b]	Related to weapon system and materiel category
Contract Personnel[b]	Related to weapon system and materiel category
Temporary Additional Duty[b]	Related to weapon system and materiel category
Training Expendable Stores	Not related to weapon system
Maintenance Supplies	Related to materiel category
Personnel Support Supplies	Not related to weapon system
POL Costs	Not related to weapon system
INTERMEDIATE COSTS	
Military Personnel	Related to weapon system and materiel category
Civilian Personnel	Related to weapon system and materiel category
Contract Personnel	Related to weapon system and materiel category
Maintenance Supplies	Related to weapon system and materiel category
DEPOT COSTS	
Aircraft Rework, Intra-DoD	Related to weapon system and materiel category
Aircraft Rework, Commercial	Related to weapon system and materiel category
Engine Rework, Intra-DoD	Related to weapon system and materiel category
Engine Rework, Commercial	Related to weapon system and materiel category
Component Rework, Intra-DoD	Related to weapon system and materiel category
Component Rework, Commercial	Related to weapon system and materiel category
Other Rework, Miscellaneous Depot	Related to weapon system and materiel category
Other Rework, Engineering Support	Related to weapon system and materiel category
TRAINING SUPPORT	
Fleet Readiness Squadron (FRS)	
Military Personnel	Not included in the LRA
Civilian Personnel	Not included in the LRA
Contract Personnel	Not included in the LRA
TAD	Not included in the LRA
Training Expendable Stores	Not related to weapon system
Personnel Support Supplies	Not related to weapon system
POL	Not related to weapon system
Operational Training	Not included in the LRA
Maintenance Training	Not included in the LRA
RECURRING INVESTMENT	
Replacement Repairables	Related to weapon system
Modifications	Related to weapon system
OTHER	
Naval Engineering and Technical Services (NETS)	Related to weapon system
Contract Engineering and Technical Services (CETS)	Related to weapon system
Publication Updates (PUBS)	Related to weapon system

[a]The Navy "organizational" category includes all personnel in squadrons, but the LRA only includes those personnel who perform logistic functions such as organizational-level maintenance.

[b]The organizational personnel in squadrons, such as pilots, are included in Navy "organizational" category, but the LRA excludes them.

Table 3. Continued

OSCER Cost Category	Treatment of Costs in LRA
MAJOR FORCE PROGRAM MISSION PROGRAM ELEMENT (PE)	
UNIT OPERATIONS	
Aircrew	Not included in the LRA
Command	Not included in the LRA
Security	Not included in the LRA
POL	Not related to weapon system
BELOW DEPOT MAINTENANCE	
Chief	Related to weapon system and materiel category
Avionics	Related to weapon system and materiel category
Consolidated	Related to weapon system and materiel category
Field	Related to weapon system and materiel category
Munitions/Airborne Missile	Related to weapon system and materiel category
Organizational	Related to weapon system and materiel category
SUSTAINING INVESTMENT	
Rep Spares Replacement	Related to weapon system
MOD Kits/Materiel	Related to weapon system
GSE	Not related to weapon system
Training Airborne Missile	Not related to weapon system
Training Munitions	Not related to weapon system
SAME MAJOR FORCE PROGRAM--SUPPORT PE	
INSTALLATION SUPPORT	
RPM	Not related to weapon system
Communications	Not related to weapon system
Base Operations	Not related to weapon system
ADVANCED TRAINING	
Officer	Not included in the LRA
Enlisted	Not included in the LRA
MAJOR FORCE PROGRAM 7	
DEPOT MAINTENANCE	
PDM/MOD	Related to weapon system
Engines	Related to weapon system
Avionics	Related to weapon system
Other	Related to weapon system
DEPOT SUPPLY ACTIVITIES	
Distribution	Not related to weapon system
Materiel Management	Not related to weapon system
Procurement	Not related to weapon system
Technical Support	Not related to weapon system
SECOND DESTINATION TRANSPORTATION	Not related to weapon system
INSTALLATION SUPPORT	
RPM	Not related to weapon system
Communications	Not related to weapon system
Base Operations	Not related to weapon system
MAJOR FORCE PROGRAM 8	
ADVANCED TRAINING	
Officer	Not included in the LRA
Civilian	Not included in the LRA
HEALTH CARE	Not included in the LRA
PCS	Not included in the LRA
INSTALLATION SUPPORT	
RPM	Not related to weapon system
Communications	Not related to weapon system
Base Operations	Not related to weapon system

Logistics costs are those costs incurred by a Service to ensure that its operational and support forces have sufficient resources to perform their missions.

The final definitions to be established are for fixed and variable costs. In the DoD, it is difficult to make definitive distinctions between those costs considered fixed and those considered variable except in the context of a particular decision.[1] In broad terms, fixed costs are those that will not vary with the alternative chosen. Variable costs are those that can be influenced by OSD and the Services. These definitions can be the source of considerable confusion in discussing weapon system costs.

Two considerations are paramount in defining fixed and variable resources in the context of any DoD discussion involving weapon systems. First, the time period of interest must be carefully specified, since in the long run all costs are defined as variable. Second, even when all decision alternatives have the same time periods of interest, these cost categories still must be conditionally defined. A resource that is "fixed" under one set of conditions may be defined as "variable"--that is, the requirement for it would change with alternative decisions--under an alternative set of conditions. In most cases, variable costs are defined as those cost elements that vary as a function of changes in level of weapon system operations or inventory over the period of interest. (All other resources are considered to be fixed.) Often, however, in a particular

[1]It must be recognized that although in the long run all costs are variable, the "long run" for some costs, such as those for fixed central support installations, can be so long that they must be considered fixed except in long-term planning studies. It is important to appreciate that we are considering fixed and variable here "in the context of a particular decision," and in the PPBS decision process most of the decisions are of such a relatively short-term nature that all costs cannot be considered variable.

analysis, this definition of variable costs is altered to exclude resources that vary in the same way with competing alternatives. In the DoD, this is a fairly widespread practice that further complicates the distinction between fixed and variable costs.[1]

It is possible to outline the differences between the basic LRA and VAMOSC concepts against the above background. VAMOSC is designed to identify those weapon system operating and support costs that can reasonably be expected to vary with potentially competing alternatives over a given period of interest. The LRA, however, is designed to identify total logistic support resources, only a part of which are weapon system costs--i.e., those resources required to support maintenance and modification of selected major weapon systems.

C. DIFFERENCES BETWEEN THE LRA AND VAMOSC

The major differences between the LRA and VAMOSC are apparent in five areas:

(1) Resource coverage
(2) Fiscal year coverage
(3) Identification of resources to weapon systems
(4) Relationship to FYDP data
(5) Manpower coverage.

Exhibit 2 summarizes these major differences. As this summary illustrates, the LRA and VAMOSC are basically intended to be used for different purposes. The LRA is designed to support the programming process and VAMOSC is not; instead, VAMOSC is designed to support the weapon system acquisition process. The LRA is to be used to answer the question "what are the total logistic resources (dollars and manpower), indicated by designated LRA logistics category, that are included in the FYDP?"

[1]Gene H. Fisher, *Cost Considerations in Systems Analysis* (Elsevier, 1971), pp. 32-47; Gary S. Becker, *Economic Theory* (Knopf, 1971), pp. 79-84.

Exhibit 2. OVERVIEW OF DIFFERENCES BETWEEN THE LRA AND VAMOSC SYSTEMS

Area of Difference	LRA	VAMOSC
Resource Coverage	Includes total logistic support resources.	Includes variable support costs.
	No operating costs per se.	Includes operating costs.
Fiscal Year Coverage	Initially, projected resources only; as subsequent LRAs are published, historical data will be accumulated.	Historical information only.
Weapon System Coverage	Only dollar resources in LRA category IA (Maintenance, Modification and Technical Support).	All data by weapon system including direct and indirect support costs.
	Only designated aircraft, ship, missile, and tank weapon systems. Probably major systems and/or those likely to be subject of major issues.	All weapon systems except for those in the force structure in insignificant numbers, requiring only limited resources.
Relationship to FYDP Data	Data can be identified to FYDP Program Element.	No requirement to relate information to FYDP.
	Data can be reconciled to FYDP data if desired, but not primary intent of LRA.	Cutoff date for each annual report is 90 days after close of the fiscal year. No requirement to update numbers subsequently.
	Prior-year data will be revised on same basis as FYDP to reflect actuals.	
Manpower Coverage	Includes fiscal year end-strength data by selected logistic function including materiel category; none by weapon system.	No fiscal year end-strength data.
	MILPERS costs for logistic personnel separately identified by function; Civilian pay costs combined with other O&M costs by functional category.	Costs for military and civilian personnel for both operating and support personnel are not separately identifiable.

VAMOSC is used to answer a different question: "what was the dollar cost, indicated by designated cost category, of operating and supporting weapon systems in the fiscal year just completed?"

Each of the major differences shown in Exhibit 2 is discussed below.

1. Logistic Resource Coverage

The first major difference between the LRA and VAMOSC is in the coverage of DoD resources.[1] The LRA coverage of logistic resources is more comprehensive than the VAMOSC coverage, since the LRA is designed to identify all of the logistic resources (as defined in Exhibit 1) in the FYDP. Some of these logistic resources are identified as to weapon system supported, some are identified according to materiel category (such as ships, aircraft, and tanks), and some are not identified by either.

VAMOSC TSSs are not designed to identify all the logistic resources in the FYDP. Instead, VAMOSC TSSs identify the operating and support costs, as defined earlier, associated with a weapon system. Most of the support cost categories and a few of the operating cost categories are similar to certain logistics categories in the LRA, but the LRA coverage of logistics is more comprehensive.

The general differences between the information coverage in VAMOSC and the LRA functional categories are listed here, using as a basis the specific differences between LRA and VAMOSC cost element structures shown in Tables 2 and 3, above. VAMOSC includes:

- Costs to operate as well as support weapon systems.
- No manpower fiscal year end-strength data.

[1]See Tables 2 and 3, above, for a more detailed comparison.

- No initial spares; only sustaining investment such as replenishment spares, modification, and equipment replacement.
- Information about modification costs limited to equipment cost only; no information about type of modification; installation costs not separately identified.
- No information about construction or housing costs.
- No information about war reserve materiel, industrial preparedness, or logistic management headquarters.
- No information about subsistence.
- Emphasis on training costs.
- Identification of all information to weapon systems at the T/M/S level.

One major difference between VAMOSC and LRA coverage is in the way operational units are handled. VAMOSC is designed to include all costs at the unit level, including those in the operations division/section (e.g., aircrew costs, unit command and administrative costs, security personnel). The LRA excludes all costs at the unit level except for those associated with maintenance and supply. Both the LRA and VAMOSC, however, include POL costs, which are often considered to be an operating cost. This is because OSD has included POL costs in the functions to be included in the LRA.

2. Fiscal Year Coverage

The LRA is designed to be published three times a year, with each FYDP update, and includes immediate-prior-year, current-year, budget-year, and outyear data consistent with the FYDP data for the same years. VAMOSC TSSs include only prior-year data.

As successive LRAs and TSSs are published, historical data bases will be accumulated in both systems. The LRA and VAMOSC data accumulated for some information elements may be similar or even identical. However, some differences will result from the fact that the VAMOSC data for a given fiscal

year must be reported no more than 90 days after the close of the fiscal year. There is no requirement to update these data once the report is published. However, FYDP data, and LRA data as well, are updated as required after the close of the fiscal year, and many of these updates occur later than 90 days after the close of the fiscal year.

3. Identification of Resources to Weapon Systems

This basic difference, while it is part of the difference in LRA and VAMOSC data coverage discussed earlier, is important enough to justify emphasis here. Because VAMOSC data are intended to display the total variable costs, as defined by the VAMOSC list of cost categories, of operating and supporting weapon systems, VAMOSC data categories were selected in an attempt to include only those resources that could reasonably be identified or allocated to weapon systems. If a cost category could not reasonably be identified to a weapon system, it was not included in VAMOSC.

The LRA cost categories were not selected on the basis of similar criteria, since the LRA includes both resources that are to be identified to weapon systems and resources that are not.

4. Relationship to FYDP Data

The LRA is designed as an annex to the FYDP with dollar data that can be reconciled to FYDP totals. The VAMOSC MISs are not required to be able to track to FYDP data. This is a fundamental difference that is inherent in the purposes of the two systems.

Another difference is that although both the LRA and VAMOSC would eventually include an historical data base composed of prior-year data, the LRA is intended to continue to produce programmed data as well. In contrast, VAMOSC contains only

historical data. VAMOSC MISs are designed to be used as elements in the DSARC decision processes, particularly in cost estimation, O&S cost threshold design, and cost collection. Historical O&S costs by weapon system and subsystem are critical to the various accounting, parametric, engineering, and simulation estimating techniques that can be utilized to estimate costs. Moreover, it is not necessary that VAMOSC data be reconcilable to FYDP data for them to be useful in the cost estimation techniques that can aid in DSARC decisions. VAMOSC MISs are also intended to provide the important historical data base useful in the process of cost collection to see how well a newly deployed system conforms to the initial cost estimates and subsequent cost thresholds submitted during the DSARC process. This does not require that VAMOSC data be trackable to FYDP data either.

LRA data, however, are primarily intended for use in FYDP resource allocation decisions, and therefore must be consistent with FYDP data.

Given that the VAMOSC and LRA data will be used for these different purposes, however, it is still legitimate to inquire as to whether common LRA and VAMOSC data sources could result in VAMOSC data that were reconcilable to the FYDP. It is possible that some centrally managed resources, such as for aircraft depot maintenance, could be represented by dollar totals in VAMOSC and the LRA that would track to dollar totals in the FYDP. To pursue this example, we can examine the depot maintenance data in the Navy TSS. This data category is intended to show all Navy O&MN dollars expended for aircraft depot maintenance during the fiscal year just completed. FYDP PE 72207N, "Depot Maintenance (Non-IF)," which displays the total O&MN dollars used by the Navy to purchase aircraft depot maintenance from all sources, would be the comparable PE. The data for VAMOSC and the data for the FYDP are both provided by the same

Navy organization, the Naval Aviation Logistics Center, Patuxent River, Maryland. For FY 77 the total VAMOSC depot maintenance cost for aircraft is very close to the PE 72207 depot maintenance expenditures, the difference being attributable to the exclusion of a few miscellaneous aircraft that did not have enough flying hours to be included in the VAMOSC data and the fact that VAMOSC data are not reported any later than 90 days after the end of the fiscal year.

Thus, although VAMOSC data are not similar to FYDP data by design, similar basic data sources may result in some VAMOSC dollar totals being close to FYDP totals, although not identical.

5. Manpower Coverage

Because VAMOSC is designed to show historical costs by weapon system, manpower end-strength data are not required. The LRA requires separate identification of military and civilian end-strengths for the appropriate functional categories. This includes identification of end-strengths to equipment related materiel categories; however, no end-strengths are identified to specific weapon systems. The costs associated with military manpower are separately identified by function, since they are funded in a separate appropriation. Costs for civilian manpower are included in the aggregated dollars shown by LRA category but are not separately identified.

D. USE OF EXISTING DATA SYSTEMS

In the main both the LRA and VAMOSC rely on existing data systems. The primary source of VAMOSC data will be the accounting systems of the Services, since the basic purpose of VAMOSC is to collect data on the resources expended to support specific weapon systems. The LRA, on the other hand, draws primarily on the data systems that support Service programming and budgeting efforts. Of course, as prior-year data are accumulated in the

LRA, data from the accounting systems may become more important, but even then they would be used primarily to check that the FYDP prior-year data were consistent with data reported by these systems.

Of more importance, however, is the fact that both programs rely on many of the same "secondary" systems to provide the data for developing allocation factors to use in distributing aggregated resources to specific weapon systems. For example, both systems may use historical data on depot level component repair costs to distribute costs for common items to weapon systems.

A final point in comparing data sources for the two programs is that since the VAMOSC TSSs require considerably less detail than does the LRA, VAMOSC is able to use many data sources that are described in our separate Service volumes as being inadequate for the LRA. The coverages required for personnel costs at the operating unit level probably provide the best example of these differences. VAMOSC requires total personnel costs at this level, so the current accounting system can provide this information. The LRA, on the other hand, requires more detailed information. For example, supply and maintenance costs must be separately identified at the operating unit level. Therefore, even though the total military personnel costs may give the Service a good starting point, additional information is necessary to provide the data elements for the LRA.

Thus, while VAMOSC and the LRA will rely on many of the same secondary data systems, VAMOSC cannot be viewed as a potential source of basic data for the LRA. There are too many differences between the two systems in basic coverage, purpose, publications requirements, and levels of detail to permit this. It might be possible, however, to use VAMOSC data to develop factors to allocate data for the LRA.

E. SUMMARY

Comparison of the VAMOSC and LRA programs is complicated by the fact that VAMOSC is in the early stages of implementation and the LRA is still in the conceptual stage. Thus, both programs are subject to modification and specific comparisons of the two, except at a high level, must be considered premature.

The most fundamental difference between the two programs is that the two systems are designed for different purposes. VAMOSC is intended to be published once each fiscal year to collect historical data measuring the variable operating and support costs incurred to support DoD weapon systems for that year. In this context, variable costs are defined as those that are most likely to vary as a result of the weapon system acquisition decisions made by OSD and the Services, as reflected in the DSARC process. Thus, VAMOSC can be viewed as a flexible data base to be used to improve the estimates of operating and support costs of alternative weapon systems.

The LRA is designed to capture information on the total DoD logistic support resources. It will be published concurrent with each FYDP update to show, by prescribed functional categories, the resources projected by DoD to support the FYDP to which it applies. Some of these resources will be identified according to major weapon systems selected by OSD at the time LRA guidance is issued. Of course, as prior year data are accumulated by successive LRAs, the LRA will also include historical data.

Insofar as the LRA contains costs related to weapon systems, with the exception of operating costs many of the data elements in the LRA data base (especially as prior year data are incorporated into the LRA) may well be the same as those in VAMOSC. It is not reasonable, however, to view this overlap in cost elements as duplicative. VAMOSC is a flexible data base to be employed to improve the cost estimates used during DSARC review

of the operating and support resources required to support weapon system alternatives. The LRA is a static display, in a rigid structure, of the total logistic resources programmed to support each FYDP. Thus, we cannot expect specific data, even historical weapon-system related cost data, to be the same in both data bases. The extent to which this will be the case probably will not be revealed until the two systems reach maturity.

Currently, while the LRA and VAMOSC rely on some of the same secondary data sources, their primary data sources are different--as would be expected given their different purposes. VAMOSC relies primarily on accounting data systems. The LRA relies primarily on the program-budget data systems that are used to update the FYDP. Even though changes in the two systems might alter this situation, it is currently not reasonable to view VAMOSC as a potential source of data for the LRA.

Chapter VI

AN LRA FOR THE ARMY

The General Research Corporation (GRC) was asked by the Army to produce an abbreviated LRA to support POM 80. In this chapter we examine the GRC work available at the time of this study to determine if their results could be integrated with ours to enable the Army to produce an expanded LRA consistent with the other Service LRAs. Appendix A contains more detailed information on GRC's work and Army data systems.

A. BACKGROUND AND CONTENTS

At the time this study was undertaken, GRC was completing research on an Army LRA.[1] OSD directed that, rather than possibly duplicating GRC's efforts, IDA should integrate the results of that research into the work being done on the other Services. Moreover, the resources provided for our task would not have permitted us to investigate Army data systems and procedures as thoroughly as in the other Services. For these reasons, our treatment of the Army is more limited in scope than our treatment of the other Services.

A review of GRC's work indicated that the lack of weapon system and manpower data in the current GRC LRA would have to be remedied if the Army is to produce an LRA compatible with those produced by the other Services. In all other areas the GRC approach to developing data elements for the Army LRA is

[1]One result of this research was Jerry L. Buffay, et al., *An Initial Feasibility Demonstration of the Army's Logistic Resource Annex (LRA) to the Five Year Defense Program (FYDP)* (McLean, Va.: General Research Corporation, 1977).

essentially consistent with the approach we followed. This is not surprising, since OSD directives and guidance have been the basis for establishing Service PPBS procedures and the data that are required to substantiate program/budget submissions.

Our examination of GRC's work on the Army LRA included a review of the abbreviated LRA prepared by GRC to support the Army POM 80 and a series of discussions with the GRC Army LRA team. In looking at the GRC work, we focused on differences between the GRC and IDA LRA data structures, the GRC approach, and the Army data sources and systems identified by GRC as potential sources of data to support an expanded LRA. We reviewed the processes used by GRC to derive data elements, including the allocation procedures used to obtain those data that could not be obtained directly from Army data bases. The purpose of this review was to assess the applicability and compatibility of these processes with our approach, rather than to verify the accuracy and relevancy of the actual data derived. The results of our examination are summarized in the remainder of this chapter.

B. ASSUMPTIONS AND GUIDELINES

In identifying the dollar resources in LRA logistics categories, GRC focused on the actual data, while we focused on the management information systems (MISs) that contain data. The GRC approach was numbers-oriented and the IDA approach was systems-oriented.

Of course, GRC's research identified many of the Army's relevant MISs, and our research tracked some actual numbers through Air Force, Navy, and Marine Corps data sources. At these basic levels, methods concentrating on numbers or systems merely represent two different approaches to determining what data are available. However, the method used also conditioned the

research emphasis of the two approaches. GRC's completed Army LRA system is primarily designed to permit GRC to produce a trial-run LRA for the Army once a year (with the POM in May) as a feasibility demonstration, while the IDA LRA systems are designed to permit the Navy, Marine Corps, and Air Force to produce an LRA internally three times a year (with each official FYDP update).

The distinction between the GRC numbers-oriented approach and the IDA systems-oriented approach necessitated that we establish the following ground rules for our examination of the concept of an Army LRA.

(1) Our examination of GRC's LRA work is not intended to verify the GRC trial run data.

(2) Our examination is not intended to verify any factors, allocations, or prorations used in the trial run.

(3) Our examination is intended to identify those Army data systems discussed by GRC that could support the same kind of systems-oriented approach for the Army LRA that IDA developed for the other Services.

(4) Our research on the Army is not intended to provide a detailed comprehensive "systems" analysis of all relevant Army PPBS MISs. Such research would require duplication of the research accomplished on the other Services, and the resources provided do not permit so intensive an investigation of MIS details.

(5) Our research is not intended to solve the problem of identifying selected logistics resources to specified weapon systems in the Army. This problem is currently being studied by GRC under contract to the Army.

(6) Our research is not intended to solve the problem of LRA system automation or mechanization. This problem is currently being studied by GRC and the work is scheduled for completion in early calendar year 1979.

(7) Our research is intended to identify the key Army MISs that could support the same kind of LRA approach for the Army that IDA developed for the other services.

The scope of our effort was defined as follows:

(1) To understand the GRC Army trial-run LRA as an example of one approach to providing LRA data.

(2) To identify the Army PPBS processes, as these processes form the institutional core of the IDA-developed LRAs for the other Services.

(3) To determine if the manpower end-strength question, which is not explicitly addressed by completed GRC research, can be approached within the context of completed research or if additional research is required. The identification of manpower end-strengths to functional logistic categories in the other Services required substantial research.

C. THE GRC LRA WORK

We have summarized the results of our examination of the GRC work using four subject headings: resource coverage, the LRA structure, derivation of data elements, and the Army PPBS. We discuss each area in terms of how the GRC work relates to our work on the LRA and whether GRC's results would enable the Army to produce an LRA consistent with those that would be produced by using the methods discussed in this study.

1. Resource Coverage

In terms of resource coverage, there are two major differences between the GRC work and the IDA research. First, the GRC work neither identifies nor discusses procedures for identifying resources according to specific weapon system supported, although it does identify maintenance, modification materiel, and spares resources according to materiel categories such as aircraft and missiles. Second, the completed GRC work includes no data on manpower end-strengths. In fact, coverage in the GRC LRA is the same as in the LRAs prepared inhouse by the Navy, Air Force, and Marine Corps for POM 80.

To some extent the differences between the GRC and IDA approaches to producing an LRA are attributable to the fact that GRC was directed to demonstrate the Army's ability to produce an LRA for the POM, not to address the problem of producing an expanded, comprehensive LRA. When GRC had completed its work

on the POM 80 LRA, the Army asked GRC to do additional research on identification of maintenance, modification, and technical support of equipment costs according to individual weapon systems and to develop a management information system enabling the Army to produce LRAs for each FYDP update. We understand that the Army also intends to incorporate manpower end-strength data into the LRA. According to the GRC research team, a procedure that could be used to identify manpower end-strengths to logistic functions was developed during the work done on the LRA for POM 80. GRC representatives state that by January 1979, when they are scheduled to complete the current phase of their research, they will have addressed the same major issues for the Army LRA that IDA has addressed for the other Service LRAs.

2. The LRA Structure

The logistic functions, subfunctions, and line items contained in the GRC Army LRA structure are essentially identical to those in the IDA structure (see Exhibit 1) because the basic LRA structure was developed by OASD(MRA&L). Although minor differences exist, the two structures can easily be made congruent if OSD desires a single structure applicable to all Services. Exhibit 3 is an overview of the functional areas in which changes would be required in the GRC LRA structure to make it congruent with our structure. This exhibit shows all required adjustments to the GRC structure except those in the depot-level maintenance category. This category is omitted because differences there are a matter of display, not of substantive differences in the information contained in the data base.[1]

[1]The GRC structure includes separate categories (lines) in the structure for customer dollars to purchase services from inhouse contractor or interservice facilities. Exhibit 1 excludes these categories but requires that separate data elements be entered into the data base to provide the same information. Thus, the resource coverage in the two structures is identical.

Exhibit 3. GRC LRA NECESSARY STRUCTURAL MODIFICATIONS

LRA Category[a]	Remarks
Manpower in Organic Depot Level Maintenance Activities (IA2)	This category would have to be added to the GRC LRA structure since, as indicated earlier, the GRC work included no data on manpower end-strengths.
Intermediate, Organizational, and Base Level Resources (IA4, IA5, IB4, IC5, IVD)	The GRC LRA structure separates these resources into Installation and Below-Installation Level categories. The former category corresponds to the BOS categories in Exhibit 1; the latter to the intermediate and organizational categories.
Modification Materiel (IA8)	Information about installation, mod spares, and types of mods would have to be added; the information in the GRC LRA structure is limited to kit costs and the total cost of aircraft reliability/maintainability mods.
Logistic Support Equipment (IIIB)	The GRC LRA structure includes the line items in the original MRA&L structure. The IDA LRA provides a revised list of equipment-related categories.
Personal Property Collateral Equipment (IVA3)	This category would have to be added to the GRC LRA structure.
Base Operations: Other Services and Support (IVD)	The GRC LRA structure includes the line items in the original MRA&L structure. The IDA LRA provides an expanded list of subfunctions.

[a]Section designations in parentheses (see Exhibit 1).

3. Derivation of Data Elements

Both the GRC research and our research included an evaluation of the procedures and data systems supporting the PPBS of the Service under study. Both sets of recommendations rely heavily on the FYDP as a source of LRA data elements, and both identify data available at the PE level and from the Procurement Annex as the source of LRA data elements. Also, both research teams had to resort to use of alternative, secondary sources and allocation procedures to obtain data below the PE and Procurement Annex line item levels. In some cases, data could be readily obtained from staff level offices or from secondary data systems. When allocation procedures were used, GRC used budget-year data to develop factors to separate out-year program totals into LRA categories. We recommended that necessary allocations be done by the same analysts who update the FYDP, using the methods they consider most appropriate, and that the data be entered directly into the primary data systems supporting the FYDP.

The two approaches to deriving LRA procurement, most O&M, and military construction data elements are essentially the same. For example, Procurement Annex line items were identified as the source for most of the LRA data elements relating procurement resources to equipment-related materiel categories (e.g., aircraft, missiles, tracked combat vehicles, etc.).

Of special interest is GRC's use of factors derived from manpower data to produce some of the data elements at levels below the PE level. For example, GRC used factors derived from counting personnel in job code categories for supply, maintenance, and transportation to allocate below-installation-level supply operations labor, maintenance labor and repair parts, and transportation to the appropriate LRA functional category. The procedures used to develop these allocation factors are similar to the job code approach discussed in

Chapter IV. Although we recommend a method of deriving manpower end-strength data elements based on manpower functional codes rather than job codes, the Army could use the job code approach for its LRA pending the possible development of a functionally oriented manpower system. The job code approach would produce end-strength data that are inconsistent with the data we derive, but this approach should provide a reasonable basis for estimating logistic manpower in Army nonlogistic organizations in the initial LRA.[1] Once the initial LRAs are published, the extent of this inconsistency could be evaluated and LRA methodology revised if desired. If the Army chooses not to develop such a manpower system, further research would be required to determine the degree of inconsistency among the Services in reporting manpower end-strength data in their LRAs.

Additional information on GRC's approach to deriving LRA data elements is contained in Appendix A. This appendix also includes a discussion of the sources of data for each functional category in the GRC LRA structure.

D. THE ARMY PPBS

In conjunction with our research on the GRC work, we examined the Army's PPBS processes and data systems. This was not intended as a comprehensive systems analysis of Army PPBS procedures and data systems but rather as an evaluation of the extent to which the Army has systems similar to those we found in the other Services.

Unlike the Navy and the Air Force, the Army does not have a centralized computerized PPBS management information system that facilitates resource programming at levels of detail below

[1]The Army could utilize the same procedures proposed by IDA for the other Services to provide all LRA end-strengths for manpower directly available at the PE level or assigned to organizations whose primary mission is logistics. See Chapter IV.

the levels required for the FYDP. However, the Army is developing such a system, which would permit the Army Staff to extract data directly from many of the secondary data systems that are now used to support the PPBS. When fully implemented, this system, called PROBE (Program Optimization and Budget Evaluation System), will be a candidate for use in producing an LRA. This system is discussed further in Appendix A.

We found that the Army's PPBS procedures are similar in many respects to those of the other Services. Many of the same Budget Exhibits and POM backup data displays are used by all of the Services. For example, the Army prepared the OP-25 Depot Maintenance Budget Exhibit to substantiate its depot maintenance program. This process is supported by an automated system that includes a 5-year projection, by equipment line item, of all resources required for depot level maintenance of Army equipment. The data in many of these line items can be related to specific weapon system; other data would have to be statistically allocated. In either case, however, use of this system to derive the LRA depot maintenance data elements is consistent with the approach we recommend for the other Services.

E. SUMMARY

Our research on the Army basically comprised an examination of GRC work done to produce a demonstration Army LRA for POM 80 supplemented by some independent review of Army PPBS procedures and data systems. On the basis of this research we conclude that by extending the GRC work to include systems to provide data on manpower and weapon system support, the Army can produce an LRA consistent with the LRAs we have outlined for the other Services.

We believe the Army has the capability to produce an LRA with its POM submittal in May 1979 that would be reasonably consistent with other Service LRAs. This assumes that the

Army would use the job code approach to derive manpower end-strength data. Weapon system data would have to be limited to that which is available in existing data bases, such as the data base for the Procurement Annex. Further development efforts are required before the Army can produce more comprehensive and consistent data for future LRAs.

Although the Army does not currently have a centralized data system to support its PPBS, work is underway to develop such a system. When the new system is operational, the Army should have an excellent capability for producing LRAs using procedures similar to those employed by the other Services.

Appendix A provides additional information about GRC's work and Army data systems.

Chapter VII

AN OSD-LEVEL LRA DATA SYSTEM

A. INTRODUCTION

In this chapter we present our preliminary recommendations regarding the systems, procedures, and resources that would be required to establish and operate an OSD-level LRA data system. These recommendations are based on:

(1) A data base "sizing" exercise (described later in this chapter).

(2) Discussions with OASD/MRA&L logistics personnel concerning anticipated uses of the data base.

(3) Discussions with OASD/MRA&L data management personnel and Air Force Data Services Center personnel who provide the necessary technical support of OSD's requirements for computer assistance.

In developing these recommendations we were concerned mainly with whether the OSD-level LRA data base is likely to be so large that it will create unusual problems for the existing systems, procedures, and resources to be used for its establishment and operation. Given the estimated size of the data base and our recommendations, we concluded that the data base is manageable within the existing OSD data management environment.

B. RECOMMENDATIONS

The following recommendations result from an examination of the LRA data base characteristics dictated by OSD requirements.

(1) The OSD-level data base should be maintained and updated in a central OSD-level system rather than in separate Service systems. This assures OSD analysts of flexibility in accessing the data base.[1]

(2) A "classified" computer system should be utilized for the data base because of the presence of classified data elements.[2]

(3) The data base storage and retrieval system for the LRA does not have to be a "real time" system that permits analytical query and response. The LRA data base may be accessed for specific data formats tailored to the particular needs of specific analysts, but such access capability does not require a real-time mode.

(4) The data received from the individual Services should be on tape.

(5) The data system for the LRA should be capable of storing the historical data that will accumulate over time.

C. DATA BASE SIZING EXERCISE

In order to provide a baseline estimate of the size of the LRA data base, we conducted a data base sizing exercise. The exercise was designed to produce an estimate of the maximum number of separate data elements that would be stored in the LRA data base.

The results of the sizing exercise are shown in Table 4. The dollar and manpower line items required by the LRA for each Service are shown. These line item data are also shown in "active" and "reserve" categories. The total number of dollar plus manpower line items for all Services is 44,400 line items. This number was then multiplied by 7, representing the number of fiscal years of data in an LRA submission, to produce the total number of data elements required in the data base--310,800. A data base of this size can feasibly

[1]Technical data management will be provided by the Air Force Data Services Center group that supports OSD.

[2]The OSD Honeywell H-635A System A is the probable system of choice.

Table 4. LRA LINE ITEMS AND DATA ELEMENTS BY SERVICE

Service	LRA Dollar Line Items			LRA Manpower Line Items			Total Line Items	Total Line Items Times 7 FYs
	Active	Reserve	Total	Active	Reserve	Total		
Navy	10,670	4,500	15,170	166	348	514	15,684	109,788
Air Force	5,850	4,100	9,950	164	312	476	10,426	72,982
Army	6,700	4,400	11,100	160	336	496	11,596	81,172
Marine Corps	3,700	2,600	6,380	110	204	314	6,694	46,858
TOTAL	27,900	15,600	42,600	600	1200	1800	44,400	310,800

be handled by the available OSD computer systems, such as the Honeywell System A.

Developing these line item estimates for each Service involved examining each line item in the LRA structure in Exhibit 1 and determining how many separate data elements would be associated with each. Table 5 illustrates the procedures used.

The five line items shown for each Service in the table are the detailed line items in the LRA structure. The estimated number of weapon systems for which separate data are required was set at 25 for the purposes of the data sizing exercise. In fact, the number 25 represents 24 separate weapon systems (type and model of aircraft such as an F-4), with the 25th entry representing a miscellaneous category to account for the remaining aircraft. The number of appropriations used is two for the Navy and four for the Air Force and Army, as it is Navy policy to fund depot maintenance on reserve Navy aircraft with active Navy O&MN dollars. In the Army and Air Force guard and reserve aircraft depot maintenance is paid for with guard and reserve O&M dollars.

The types of facilities counted are industrially funded, nonindustrially funded, commercial, and interservice activities in each Service. The fifth type for the Navy represents maintenance of Marine Corps aircraft, added in this category simply to make Navy data estimation easier.

The entries in the total data element column are the product of multiplying the estimated number of weapon systems by appropriations and types of facility. Repeating this process for each line item in Table 5 yields the total of 5,250 possible data element line items that could each be a separate entry in the LRA data base. Repeating this process for all the line items in the entire LRA structure, both for dollars and manpower, results in the total of 44,400 data element line items as shown in Table 4.

Table 5. EXAMPLE OF LINE ITEM DATA ELEMENT ESTIMATION

Aircraft Depot Maintenance	Estimated Number of Weapon Systems	Number of Appropriations	Types of Facility	Maximum Total Data Elements Per Line Item
Navy				
(1) Airframe reworks	25	2[a]	5[b]	250
(2) Engine overhaul	25	2	5	250
(3) Component repair	25	2	5	250
(4) Modification installation	25	2	5	250
(5) Other maintenance and support	25	2	5	250
Air Force				
(1) Airframe reworks	25	4[c]	4[d]	400
(2) Engine overhaul	25	4	4	400
(3) Component repair	25	4	4	400
(4) Modification installation	25	4	4	400
(5) Other maintenance and support	25	4	4	400
Army				
(1) Airframe reworks	25	4[e]	4[d]	400
(2) Engine overhaul	25	4	4	400
(3) Component repair	25	4	4	400
(4) Modification installation	25	4	4	400
(5) Other maintenance and support	25	4	4	400
Marine Corps[f]	--	--	--	--
TOTAL				5,250

[a] O&MN and MPN. Reserve appropriations are not shown in Navy aircraft depot maintenance customer funds.

[b] IF, Non-IF, Commercial, Interservice, and "Marine Corps" (identifying Navy depot maintenance provided to Marine Corps aircraft).

[c] O&MAF, MPAF, Reserve O&M, and Guard O&M. Reserve appropriations are shown as customer funds.

[d] IF, Non-IF, Commercial, and Interservice.

[e] O&MA, MPA, Reserve O&M, and Guard O&M. Reserve appropriations are shown as customer funds.

[f] All aircraft depot maintenance is paid for from Navy appropriations.

Appendix A

ADDITIONAL INFORMATION CONCERNING AN LRA FOR THE ARMY

ADDITIONAL INFORMATION CONCERNING AN LRA FOR THE ARMY

A. THE GRC LRA APPROACH AND DATA SOURCES

To identify FYDP dollar resources to LRA categories, GRC used the "budget-constrained" approach, which consists of two steps. Step one is to identify a dollar control total in the FYDP that represents logistic resources, and step two is to either distribute or allocate the control total to one or more of the logistic line items in the LRA as required. In some cases, GRC determined that a FYDP control total and an LRA line item could be uniquely identified.

For example, the GRC report identifies six FYDP Army program elements for which total dollars equate to a single LRA line item. The line item is "Traffic Management and Terminals (MTMC)," and the six PEs are: 43111A, "Port Terminal Operations (IF)"; 43112A, "Port Terminal Operations Commercial (IF)"; 43113A, "Traffic Management (IF)"; 43114A, "Defense Freight Railway I/C Fleet (IF)"; 43166A, "MTMC Support Activities"; and 43168A, "Revenues (MTMC) (IF)."

We treat PEs that equate directly to an LRA line item similarly where applicable. Using the same example, dollar resources for the Traffic Management and Terminals (MTMC) line item in the ILA Air Force LRA are derived directly from two PEs: 43111F, "Port Terminal Operations (IF)," and 43113F, "Traffic Management (IF)."[1]

[1]There are no dollar resources in this line item in the Navy and Marine Corps LRAs because no resources are programmed for this function in these Services.

The GRC report notes that in most cases a single LRA line item "consisted of resources from several PEs or, conversely, the resources contained in one PE had to be applied to several functional categories." In these cases, the GRC approach required research into "supporting data such as Army Management Structure Code (AMSCO) detail, construction category codes, etc."[1] This research represents one of the critical stages in the preparation of an LRA, since these are the data that are not available in the printed OSD FYDP in the logistics categories required by the LRA.

GRC carried out its supporting data research by seeking specific offices that could provide the data for the extensive analysis required. Exhibit A-1 shows the results of the GRC research, on which the following summary assessments of GRC data sources and procedures are based.

(1) Both GRC and IDA base their approaches to obtaining procurement appropriation data on use of Procurement Annex data.

(2) GRC's approach to obtaining O&M data uses budget year data to produce factors for outyear data, while our approach uses program data for these outyears.

(3) GRC used allocation methods to determine data for below installation level maintenance, supply, and transportation; IDA focused on programmed dollars in these categories.

(4) The GRC allocation factors for dollars could also be used to allocate manpower end-strengths.

(5) GRC and IDA treat construction resources similarly.

(6) GRC utilized the Army's BOS Resource Management System (Z accounts), which carries greater detail applicable to the LRA than is available in other Services.

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[1]The Army Management Structure Code (AMSCO) represents a classification of planned and actual obligations or expenditures and reimbursements in terms of end objectives, purposes, or things that are the basis for preparation and support of budget requests for appropriations and apportionment. See Army Regulation 37-1000, *Financial Administration Account/Code Structure*, November 1977. This coding structure is discussed in greater detail below.

Table A

LRA Category	Source of Data	
Depot Level Maintenance and Modification Alteration Installation	Active Army O&MA data are taken from the OPS-25 Series Depot Maintenance Program Exhibit. This exhibit series includes data for the FYDP outyears. Reserve and National Guard analysts provided manually prepared data for major equipment categories, although the Reserve data was for FY 79 only. Reserve data for FY 80 were factored from FY 79-based ratios.	O&MA data wer work for airc tions-electro lars are not from appropri "depot level item. Inter- from other Se
Sustaining Engineering and Technical Support	O&MA data are taken from the OPS-25 Series Exhibits.	
Installation Level Maintenance	The O&MA data were developed from the "Z" accounts of the Army Management Structure Code system.	The Z account for the entir categories by
Below Installation Level Maintenance	The data were derived by a series of factors. Separate manpower factors were developed for the total Army below installation maintenance personnel (determined by Job-codes-MOSs) in three categories: organizational, direct support, general support, and the factors are percentages of personnel in these categories out of total Army personnel. Given the factors developed by GRC, the total MPA dollar resources in Army PEs in FYDP Program 2 (excluding BOS dollars) were allocated to the three below installation level maintenance categories based on the personnel factors. Repair parts factors were based on the average annual maintenance man-hours spent on equipment at the three below installation levels: organizational, DS,GS. On the assumption that repair parts consumption at each of these three levels is proportional to the number of man-hours expended at each level, the total applicable Stock Fund repair parts budget is factored using the man-hour proportions.	The factoring additional co
Initial Spares and Repair Parts Replenishment Spares and Repair Parts Modification Kits and Alteration Material	The data for each of these three categories were taken exclusively from the Procurement Annex. Under each category, data are presented according to materiel categories such as aircraft, missiles, tracked combat vehicles, etc. The LRA line items are directly equivalent to line items in the Procurement Annex.	The Army uses Annex line it the aircraft line item for 10 (Air), Ite Aircraft Init which is Proc which is equi in the LRA li
Supply System Operations-Depot Level	Program and Budget System (PROBUS) O&MA data provided to GRC by Office of Deputy Chief of Staff/Logistics are the source of the O&MA dollars in the GRC Army LRA. Military personnel dollars are extracted from several PEs.	
Supply System Operations-Installation Level	The O&MA data were developed from the "Z" accounts of the Army Management Structure Code system.	There is a "su
Supply System Operations-Below Installation Level	The data were derived from a series of factors developed in accordance with the MPA approach described in the table above for "below installation level maintenance" MPA. Percentages of personnel in specified MOSs (job codes) were used to allocate the total MPA resources in Army PEs in FYDP Program 2 (excluding BOS dollars) to the Three "levels" of supply system operations: Organizational, direct support, general support.	The factoring qualifications

Table A-1. SUMMARY OF GRC ARMY LRA DATA SOURCES BY LRA CATEGORY

Data	Remarks
from the OPS-25 Series it. This exhibit series ears. analysts provided r equipment categories, or FY 79 only. Reserve om FY 79-based ratios.	O&MA data were provided to GRC for organic and contract depot maintenance work for aircraft, missiles, combat vehicles, weapons armament, communications-electronics equipment, and other equipment. Military personnel dollars are not contained in the OPS-25 exhibits, and were obtained instead from appropriate PEs and entered in the GRC LRA as a single total for the "depot level maintenance and modification alteration installation" line item. Inter-service maintenance data for Army purchases of maintenance from other Services is not separately displayed.
S-25 Series Exhibits.	
om the "Z" accounts of ode system.	The Z accounts provided a single "maintenance of material" O&MA dollar total for the entire Army for each fiscal year. This total was "spread" to equipment categories by factors based on types of equipment in representative Army battalions.
es of factors. Separate for the total Army below nel (determined by Job- : organizational, direct he factors are percentages s out of total Army per- loped by GRC, the total s in FYDP Program 2 located to the three below categories based on the based on the average annual equipment at the three below ional, DS,GS. On the assump- ion at each of these three umber of man-hours expended able Stock Fund repair parts n-hour proportions.	The factoring process for both personnel dollars and parts dollars involves additional complications and qualifications not explicitly described here.
e categories were taken t Annex. Under each cate- ing to materiel categories cked combat vehicles, etc. equivalent to line items	The Army uses standard study numbers (SSNs) which are equivalent to Procurement Annex line item details. As an example, the data entered by GRC in the LRA for the aircraft initial spares line item is taken directly from Procurement Annex line item for Budget Activity 03 (Spares and Repair Parts), Budget Subactivity 10 (Air), Item Number 3300AA095A, which is equivalent to the Army SSN AA095A, Aircraft Initial Spares. Another example is ammunition replenishment spares, which is Procurement Annex line item BA 01, BSA 50, Item Number 6250EA065L, which is equivalent to the Army SSN EA065K, and this is the dollar total entered in the LRA line item for ammunition replenishment spares.
US) O&MA data provided to f Staff/Logistics are he GRC Army LRA. Military from several PEs.	
m the "Z" accounts of the system.	There is a "supply operations" line item in the BOS Z accounts.
ies of factors developed ach described in the tion level maintenance" in specified MOSs (job total MPA resources in luding BOS dollars) to the operations: Organiza- support.	The factoring process for personnel dollars involve additional complications and qualifications not explicitly described here.

2

LRA Category	Source of Data	
Second Destination Transportation	Data were received as manually prepared hard copy from ODCSLOG, based on detailed data available for PE 78010.	
Traffic Management Command (MTMC)	Data were extracted directly from the FYDP for applicable PEs: 43111A, 4311aA, 43113A, 43114A, 43166A, 43168A.	
Transportation Services (Installation Level)	Data were obtained from BASEOPS Z account AMSCO "D," transportation services.	
Transportation Services (Below-Installation Level)	The data were derived from a series of factors developed in accordance with the MPA approach described above in the table for "below installation level maintenance" MPA. Percentages of personnel in specified MOSs (job codes) were used to allocate the total MPA resources in Army PEs in FYDP Program 2 (excluding BOS dollars) to the three "levels" of transportation services: organizational, direct support, general support.	The invo tion
Logistic Support of Force Operations and Training	The data requirement is for two categories of largely stock funded materials, fuel and personnel support material. GRC provided only one year of data in these categories. The reason expressed was "the difficulty associated with projecting future Stock Fund Transactions."	The prov ODCS
Munitions - Peacetime Operations and Training (Procurement)	GRC concluded, based on interviews with personnel in the Office, Deputy Chief of Staff for Research, Development and Acquisition, that it is "virtually impossible" to determine precisely the portion of procurement dollars representing this category and its subcategories: ammunition, tactical missiles, other munitions. Data were accepted as "best judgment" estimates from ODCSRDA personnel.	
War Reserve Stockage - Ammunition Procurement	GRC took the total Ammunition Procurement, Army, appropriation in the FYDP and from it subtracted dollars in the amounts that appeared elsewhere in the LRA for this appropriation. As an example, the entry for ammunition spares and repair parts in the initial spares portion of the LRA would be subtracted from the appropriation total. The remainder after all subtractions, the residual of the total appropriation, is entered here.	
War Reserve Stockage - Tactical Missile Procurement	The Procurement Annex budget subactivity categories for surface-to-surface, surface-to-air, and air-to-surface missiles were the basis for total procurement dollars in these categories. Then, the estimated "peacetime operations and training" dollars in these categories, discussed above, were subtracted from each category. The residuals were entered as the LRA data for this category and its subcategories.	
War Reserve Stockage - Aircraft Spares and Repair Parts (Procurement) War Reserve Stockage - All Other War Reserve Spares and Repair Parts	Data for these two categories were extracted from PE 28031A, War Reserve Materiel - Equipment/Secondary Item, by appropriation. Thus, for the first category at the left, the PE 28031A dollar entry for Procurement of Aircraft, Army, is the LRA entry. The all other category at left is made up of all other procurement appropriations shown in the PE.	
War Reserve Stockage - Stock Funded Materiel	Data for this category were extracted from PE 28032A, Stock Fund WRM (Service Controlled). The subcategory data (repair parts, clothing, other supplies) are available only for the budget year, according to GRC interviews with stock fund personnel in the Stock Fund Division.	

Table A-1. Continued

Source of Data	Remarks
ta were received as manually prepared hard copy from CSLOG, based on detailed data available for PE 78010.	
ta were extracted directly from the FYDP for applicable e: 43111A, 4311aA, 43113A, 43114A, 43166A, 43168A.	
ta were obtained from BASEOPS Z account AMSCO "D," ansportation services.	
e data were derived from a series of factors developed accordance with the MPA approach described above in the ble for "below installation level maintenance" MPA. Per-ntages of personnel in specified MOSs (job codes) were ed to allocate the total MPA resources in Army PEs in FYDP ogram 2 (excluding BOS dollars) to the three "levels" of ansportation services: organizational, direct support, neral support.	The factoring process for personnel dollars involves additional complications and qualifications not explicitly described here.
e data requirement is for two categories of largely stock nded materials, fuel and personnel support material. GRC ovided only one year of data in these categories. The ason expressed was "the difficulty associated with pro-cting future Stock Fund Transactions."	The single year of data are for the budget year, provided to GRC by the Stock Fund Division of ODCSLOG.
C concluded, based on interviews with personnel in the ffice, Deputy Chief of Staff for Research, Development and quisition, that it is "virtually impossible" to determine ecisely the portion of procurement dollars representing is category and its subcategories: ammunition, tactical ssiles, other munitions. Data were accepted as "best dgment" estimates from ODCSRDA personnel.	
C took the total Ammunition Procurement, Army, appropria-ion in the FYDP and from it subtracted dollars in the amounts at appeared elsewhere in the LRA for this appro-iation. As an example, the entry for ammunition spares and pair parts in the initial spares portion of the LRA would be btracted from the appropriation total. The remainder after l subtractions, the residual of the total appropriation, is tered here.	
e Procurement Annex budget subactivity categories for surface-surface, surface-to-air, and air-to-surface missiles were the sis for total procurement dollars in these categories. Then, e estimated "peacetime operations and training" dollars in ese categories, discussed above, were subtracted from each tegory. The residuals were entered as the LRA data for this tegory and its subcategories.	
ta for these two categories were extracted from PE 28031A, War serve Materiel - Equipment/Secondary Item, by appropriation. us, for the first category at the left, the PE 28031A dollar try for Procurement of Aircraft, Army, is the LRA entry. The l other category at left is made up of all other procurement propriations shown in the PE.	
ta for this category were extracted from PE 28032A, Stock Fund M (Service Controlled). The subcategory data (repair parts, lothing, other supplies) are available only for the budget year, ccording to GRC interviews with stock fund personnel in the Stock und Division.	

LRA Category	Source of Data
Industrial Preparedness Ammunition Production Base Investment (Procurement) Other Industrial Facilities Investment (Procurement) Manufacturing Technology (Procurement)	Data for these categories were developed exclusively from the Procurement Annex. Specific line items in each subcategory at the left were identified, totaled, and entered for the LRA.
Industrial Preparedness - Operations	The O&MA data for this category and its subcategories were obtained by GRC in nonautomated formats from ODCSLOG. The subcategory detail was based on the AMSCO point accounts fo PEs 78011, Industrial Preparedness, and 78012, Logistic Support Activities. The MPA dollars were factored to the subcategories based on the OMA proportions in each subcateg
Logistics Management Headquarters	Data were obtained from three PEs, 43193A, Management Headquarters (Traffic Management), 43199A, Revenues (Management Headquarters-Traffic Management), 72898A, Management Headquarters (Logistics).
Logistic Support Equipment (Procurement)	The Procurement Annex was examined for detailed line items that in GRC's judgment fit into this category and its subcategories.
Other Logistic Support	The data for the "property disposal" subcategory were deriv from AMSCO detail in PE 78012A, Logistic Support Activities The "other" subcategory data were derived from PE 78012, PE 78017, Maintenance Support Activities, and PE 72829, Logistic Administrative Support.
Facilities Construction (Less Housing)	Data are available in the Army "Military Construction Army Program" report that provides detailed breakdowns of MCA by categories of construction that align with the LRA categori
Family Housing	Data derived directly from PE totals in FYDP.
Troop Housing Construction	Data are available in the Army "Military Construction Army Program" report.
Real Property Maintenance Activities Base Operations - Other Services and Support	Data are available in the BASEOPS Z accounts of the AMSCO system.

Table A-1. Continued

f Data	Remarks
e developed exclusively from ffic line items in each sub- ntified, totaled, and	
ry and its subcategories were ed formats from ODCSLOG. The on the AMSCO point accounts for dness, and 78012, Logistic dollars were factored to the A proportions in each subcategory	
PEs, 43193A, Management Head- , 43199A, Revenues (Management nt), 72898A, Management Head-	The two Program 4 PEs were included in this category and not in the LRA transportation line item because, according to GRC, this provides better visibility of an area that is of special interest to OSD.
mined for detailed line items to this category and its sub-	
aposal" subcategory were derived A, Logistic Support Activities. were derived from PE 78012, Activities, and PE 72829, rt.	
"Military Construction Army detailed breakdowns of MCA by t align with the LRA categories.	
totals in FYDP.	
"Military Construction Army	
OPS Z accounts of the AMSCO	

Each of these overall assessments of GRC data sources and procedures is discussed below.

1. Procurement Data in the GRC Army LRA

The GRC approach to obtaining procurement data is basically similar to the IDA approach: both seek to extract as much data as possible directly from the detailed line items in the Procurement Annex. Like GRC, we found that most LRA requirements for procurement data at the materiel category level (i.e., aircraft, missiles, tracked combat vehicles) can be met by the Procurement Annex. GRC was not tasked with identification of procurement resources to the weapon system level, so the Procurement Annex backup data we require the other Services use was not required by GRC for the Army.

The Army LRA, like the LRAs we developed for the other Services, includes procurement data in the following categories:

(1) Initial and replenishment spares
(2) Modification and conversion hardware
(3) Munitions and war consumables
(4) Industrial preparedness procurement
(5) Logistic support equipment.

The data for items 1, 2, 4, and 5 were directly extracted from the Procurement Annex. Line items in the Procurement Annex, identified in the Army by Standard Study Numbers (SSNs), were identified by GRC to the appropriate LRA line items. Exhibit A-2 illustrates this process, showing the LRA line items for initial and replenishment spares and the Procurement Annex SSNs that GRC identified to them. The LRA categories "Modification and Conversion Hardware," "Industrial Preparedness Procurement," and "Logistic Support Equipment" were assigned appropriate Procurement Annex SSNs in the same manner.

Exhibit A-2. EXAMPLES OF ARMY PROCUREMENT ANNEX LINE ITEMS ASSIGNED TO LRA CATEGORIES: INITIAL AND REPLENISHMENT SPARES

LRA Category	Army Data Source		
	SSN	Title	Appropriation
Initial Spares and Repair Parts			
Aircraft	AA095A	Initial Spares and Repair Parts (Air)	Aircraft Procurement, Army
Missiles	CA025A	Initial Spares and Repair Parts (Missile)	Missile Procurement, Army
Tracked Combat Vehicles	GA015A	Initial Spares and Repair Parts (Tracked Combat Vehicles)	Procurement of Weapons and Tracked Combat Vehicles, Army
Weapons and Other Combat Vehicles	GC015A	Initial Spares and Repair Parts (Weapons and Other Combat Vehciles	Procurement of Weapons and Tracked Combat Vehicles, Army
Ammunition	EA065A	Initial Spares and Repair Parts (Ammo)	Procurement of Ammunition, Army
Communications - Electronics	BA960A	Initial Spares and Repair Parts - Other (Communications-Electronics)	Other Procurement, Army
	BA950A	Initial Spares and Repair Parts-Telecommunications	
	BA970A	Initial Spares and Repair Parts-COMSEC	
Other Equipment	DA035A	Initial Spares and Repair Parts (TAC)	Other Procurement, Army
	MA035A	Initial Spares and Repair Parts (Other)	
Replenishment Spares and Repair Parts			
Aircraft	AA095K	Replenishment Spares and Repair Parts (Air)	Aircraft Procurement, Army
Missiles	CA025K	Replenishment Spares and Repair Parts (Missile)	Missile Procurement, Army
Tracked Combat Vehicles	GA015K	Replenishment Spares and Repair Parts (Tracked Combat Vehicles)	Procurement of Weapons and Tracked Combat Vehicles, Army
Weapons and Other Combat Vehicles	GC015K	Replenishment Spares and Repair Parts (Weapons and Other Combat Vehicles)	Procurement of Weapons and Tracked Combat Vehicles
Ammunition	EA065K	Replenishment Spares and Repair Parts (Ammo)	Procurement of Ammunition, Army
Communications-Electronics	BA960K	Replenishment Spares and Repair Parts-Other (Communications and Electronics)	Other Procurement, Army
	BA950K	Replenishment Spares - Telecommunications	
	BA970K	Replenishment Spares and Repair Parts-COMSEC	
Other Equipment	DA035K	Replenishment Spares and Repair Parts (TAC) Replenishment Spares and Repair Parts (Other)	Other Procurement, Army
	MA035K		

The data for item 3, munitions and war consumables, were not directly extracted from the Procurement Annex by reference to SSNs.[1] Because the Procurement Annex does not categorize munitions as for peacetime operations or war consumable stocks, GRC relied on estimates based on discussions with Army staff personnel. There were two estimates--one for total peacetime operations and training ammunition and one for tactical missiles.[2]

To derive the data for war reserve stocks in the ammunition category, GRC began with the total Procurement of Ammunition, Army (PAA), shown in the Procurement Annex. From this total they subtracted any PAA dollars in other logistics categories in the LRA (spares, mod kits), including the peacetime consumption estimate mentioned above, and the remainder was declared to be the ammunition war reserves value. A similar procedure was followed for tactical missile war reserves.

We were able to determine how the Navy, Air Force, and Marine Corps could satisfy the LRA requirements for data on munitions for peacetime operations and training and war reserve stockage, so it was not necessary to follow the approach adopted by GRC for the Army.

2. O&M Data in the GRC Army LRA

The GRC approach to O&M data is basically similar to our approach, although we emphasized use of O&M resource "programming"

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[1]GRC explained that "based on interviews with civilian and military members of the ODCSRDA (Office of the Deputy Chief of Staff for Research, Development and Acquisition), the GRC study team is convinced it is virtually impossible to determine precisely the portion of procurement dollars representing the procurement of munitions intended for 'Peacetime Operations and Training'."

[2]Our sources of data for the other Services were POM displays and discussions relating directly to war reserve munitions and war consumables. Materials similar to these are available in the Army POM and POM Annexes and could provide more systematic alternatives to Army staff personnel estimates.

management information systems while GRC emphasized use of O&MA resources budgeting systems. The principal reason for this difference is that the Army lacks an integrated automated programming capability analogous to the Air Force F&FP System (see Volume III) or the Navy NCIS/FYDP Subsystem (see Volume II). Such a system would permit the Army to extract depot maintenance data elements directly from the data base that is used to update the LRA. GRC therefore elected to use allocation procedures to identify dollars at the PE level to the proper LRA category. The Army does have a depot maintenance data system that produces line item data for the entire 5-year period covered by the FYDP. This system permits the Army to use the approach we recommend for the other Services to provide LRA data elements for the depot maintenance category.

The management of base operations resources in the Army is structured by the Army Program 11 (Z accounts) Resource Management System (discussed separately below), which provides O&M detail in many of the categories required for the LRA.

Below installation level O&M dollars are allocated; this process is discussed in the next section.

3. Below Installation Level Allocations

GRC allocated MPA dollars and O&MA repair parts dollars to the LRA categories of below installation level maintenance, below installation level supply, and below installation level transportation. Factors were used to distribute outyear control totals, available at the PE level, to the required LRA categories. This approach was used as being a reasonable approximation of the way in which Army programmers develop their FYDP outyear data.

The data allocations for below installation level supply operations labor, maintenance labor and repair parts, and transportation labor were based on factors derived from counting

personnel in job code categories for supply, maintenance, and transportation.[1] GRC provided us with examples of these factors. For below installation level supply operations, GRC determined that .0949 percent of the total military personnel in Army force units could be identified to job codes that qualified as supply operations. This percentage became the below installation level supply operations "factor."

To derive the total MPA dollars attributable in the Army to below installation level supply operations, this factor was multiplied by the total Army FYDP major force Program 2 MPA (less base operations MPA dollars). The resulting product became the below installation level supply operations MPA LRA entry. Similar procedures were followed for deriving and using factors for below installation level maintenance MPA and below installation level transportation MPA.

4. Manpower End-Strengths

As stated earlier, GRC did not specify procedures by which to derive manpower end-strengths. However, GRC's allocation factor methodology for some functional categories involves procedures that could be utilized, if desired, to derive manpower end-strengths for an Army LRA consistent with the GRC approach.

Essentially, GRC accumulates personnel by logistics job codes from the Army job code (MOS) personnel files, calculates the proportion of personnel in each job code to the total Army manpower strength, and uses these proportions as weights to allocate MPA control totals to the LRA categories corresponding to the job codes.

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[1]The military personnel "counted" for the derivation of factors are TOE military authorizations. GRC stated that "no attempt was made to use actuals or to include civilian strengths due to the added complexity this would impose." Thus, GRC assumed that using actual strengths or including civilian strengths would not significantly change the relative percentages.

A similar process could be utilized to allocate manpower end-strengths to LRA categories. For example, all Army FYDP Program 2 manpower end-strengths could be summed to provide a Program 2 control total. Then, the factors already calculated for below installation level maintenance, below installation level transportation, and below installation level supply could be used to determine what portions of the Program 2 end-strength control total should be allocated to these categories.

Part of our manpower recommendation for the Air Force, Navy, and Marine Corps is that primary logistic mission organization personnel, regardless of job code, be categorized by the LRA function that corresponds to the organization logistic mission. GRC allocates MPA dollars in the "Depot Level Maintenance and Modification/Alteration Installation" LRA category on the assumption that all personnel at depot maintenance facilities perform a depot maintenance logistics function. Instead of allocating MPA to the various LRA line items under the depot maintenance heading, GRC lumps all the MPA dollars into a single total for the entire depot maintenance category. Thus, GRC's treatment of depot maintenance MPA dollars is similar to our treatment of depot maintenance end-strengths: resources at depot maintenance facilities are identified to the depot maintenance function.

5. Construction and Housing

Construction and housing resources are treated identically by IDA and GRC. Both rely on DoD-prescribed construction category FYDP and budget backup detail for the Service construction appropriations (including troop housing). For the family housing data, both rely on the data displayed in discrete FYDP family housing PEs.

6. Base Operations

The GRC Army LRA relies on the Army Program 11 (Base Operations) Resource Management System for considerable line item detail in the BOS area. Currently, the Army BOS line item detail available more closely matches the BOS detail required for the LRA than does the detail available in Navy, Air Force, or Marine Corps data management systems.

The Army's BOS Program 11 Resource Management System (BOS-RMS) serves several functions. Those uses of the accounting line item structure (Z accounts) most relevant to an Army LRA are listed below.

(1) The BOS-RMS is the system used to prepare and maintain Army BOS functional account data and audit trails for the execution year and for the outyears. This outyear capability, as GRC notes in its discussions, is particularly relevant to the LRA.

(2) The BOS-RMS is used to prepare both summary and detailed reports that are provided with the Army's budget submissions in October and January.

(3) The BOS-RMS is used to prepare funding controls for BOS appropriations.

(4) The BOS-RMS is used to provide displays and special reports used in the analysis and interpretation of current, budget, and program year funding and manpower actions.

The BOS-RMS uses 16 functional account codes for the Z accounts and 2 manpower codes (see Exhibit A-3).

These codes permit manpower (man-years and end-strengths) and dollars by functions to be identified for BOS at Army activities. Several of these line items are directly equivalent to line items in the Army LRA, and also are equivalent to many of the line items in the BOS definition currently under development in OSD.

Exhibit A-3. ARMY BOS RESOURCE MANAGEMENT SYSTEM FUNCTIONAL ACCOUNT CODES

Code	Title
A	Audio-visual services
B	Supply operations
C	Maintenance of materiel
D	Transportation services
E	Laundry and dry cleaning services
F	The Army food service program
G	Personnel support
H	Bachelor housing furnishings support
J	Operation of utilities
K	Maintenance and repair of real property
L	Minor construction
M	Other engineering support
N	Administration
P	Data processing activities
Q	The Army commissary operations
R	Installation restoration
S	End strength
Y	Man years

B. ARMY PPBS DATA SYSTEMS

The Army does not have a centralized computerized PPBS management information system (MIS) that facilitates resource programming at levels of detail below the levels included in the FYDP (manpower end-strengths and appropriations by PE). The Navy and the Air Force have MISs that permit programming at the lower levels of detail that the LRA structure requires, and this is why we emphasize use of these Service programming systems in our discussion of the other Services.

The Army is developing a centralized PPBS MIS that includes detail below the FYDP PE level. The system, called PROBE, is intended to permit Army Chief-of-Staff-level offices to utilize the various data systems that are employed in programming and budgeting analyses and evaluations. These systems are listed in Exhibit A-4.

The most relevant of these data management systems are discussed below in two broad categories--systems relevant to manpower resources and systems relevant to dollar resources.

1. Manpower Data Management Systems

a. Force Accounting System

The broad management functions served by the Force Accounting System (FAS) include the provision of automated capabilities to record, manage, and retrieve detailed data for all units of the active Army and Reserves in support of the Army PPBS. The FAS contains the official Army Force Program (AFP),[1] which is used as follows:

(1) To establish the Active Army approved force (troop list) for each current, budget, and program year.

(2) To establish the Active Army military and civilian manpower programs (end-strengths) for the current, budget, and program years.

(3) To identify the Reserve force structure.

(4) To provide force programming guidance to Army commands and agencies.

(5) To provide a basis for the projection of asset demands and availabilities for force support.

(6) To present an approved schedule of activations and inactivations, reorganizations, deployments, and similar actions.

(7) To support the Army budget request throughout the budget cycle.

(8) To provide POM support throughout the programming cycle.

[1]The Army Force Program is the Army's force structure management system through which it develops the force structure approved by the Secretary of Defense for current, budget, and program years.

Exhibit A-4. CANDIDATE DATA SYSTEMS FOR THE PROBE DATA BASE

System Designator	System	Primary Staff Agency Utilizer
FAS	Force Accounting System	Deputy Chief of Staff, Operations
TAADS	The Army Authorization Documents System	Deputy Chief of Staff, Operations
SACS	Structure and Composition System (LOGSACS, PERSACS)	Deputy Chief of Staff, Operations
AFP	Army Force Program	Deputy Chief of Staff, Operations
TOE	TOE File System	Deputy Chief of Staff, Operations
CSFOR-78	Automated Manpower Utilization Reporting System	Deputy Chief of Staff, Operations
PAAS	Personnel/Authorizations Analysis System	Deputy Chief of Staff, Operations
BOIP	Basis of Issue Plans System	Deputy Chief of Staff, Operations
SIGMA	SACS Information Gathering and Analysis	Deputy Chief of Staff, Operations
FDMIS	Force Development Management Information System	Deputy Chief of Staff, Operations
RADAR	Rapid Authorization Data Retrieval	Deputy Chief of Staff, Operations
FACTS	Force Accounting Terminal System	Deputy Chief of Staff, Operations
STARDAS	Standard Research and Development Acquisition System	Deputy Chief of Staff, Research, Development and Acquisition
PDB	Procurement Data Base	Deputy Chief of Staff, Research, Development and Acquisition
ARDIS	Army Research and Development Information System	Deputy Chief of Staff, Research, Development and Acquisition
MARDIS	Modernized ARDIS	Deputy Chief of Staff, Research, Development and Acquisition
CAFAS	Computer Assisted Fund Allocation System	Deputy Chief of Staff, Research, Development and Acquisition
RDAC	RDTE Program Change Proposals	Deputy Chief of Staff, Research, Development and Acquisition
ABS	Automated Budget System	Comptroller of the Army
OMA	O&M, Army Budget Cost Model	Comptroller of the Army
PROBUS	Program Budget System (OMA)	Comptroller of the Army
PII RMS	Program II Resource Management System	Comptroller of the Army
CBS	Civilian Budgeting System	Comptroller of the Army
AMSIS	Army Management Structure Infqrmation System	Comptroller of the Army
ELIM/COMPLIP	Enlisted Inventory Model Computation of Manpower Programs Using Linear Programming	Comptroller of the Army
MPA	Military Personnel Army Budget Model	Comptroller of the Army
TMMM	Transient Man-Months Model	Comptroller of the Army
CBS	Continuing Balance System	Deputy Chief of Staff, Logistics
SAMS	Standard Army Maintenance System	Deputy Chief of Staff, Logistics
DMSA	Depot Maintenance Selected Analysis Model	Deputy Chief of Staff, Logistics
FYDP	Five Year Defense Program	Directorate of Program Analysis and Evaluation

One result of developing the AFP and recording it in the FAS is the official Army "M-Force." This is the official Headquarters, Department of the Army (HQDA) record of Army units, their military and civilian manpower requirements, and their authorized end-strengths for the current, budget, and program years.

The M-Force is maintained in Army Management Structure Code (AMSCO) detail for each UIC in the Army.[1] In addition to UICs, manpower are also recorded by FYDP PEs and Defense Planning and Programming Categories.

b. The Army Authorization Documents System

The primary function of The Army Authorization Documents System (TAADS) is to provide the documented personnel and equipment requirements and authorizations for each organization in the M-Force for which resources are programmed and budgeted. TAADS is a source of data for the FAS MIS. Each Army authorization document is updated by lower level commands into the TAADS data management system. TAADS also provides data to the Structure and Composition System (SACS).

c. Structure and Composition System

The SACS interacts with the FAS, TAADS, and Basis of Issue Plan (BOIP) data bases and computes initial equipment and personnel requirements or authorizations for actual or hypothetical forces for various fiscal years as required.[2] SACS is not a

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[1]The Army Management Structure Code represents a classification of planned and actual obligations or expenditures and reimbursements in terms of end objectives, purposes, or things that are the basis for preparation and support of budget requests for appropriations and apportionment. See Army Regulation 37-100, *Financial Administration Account/Code Structure*, November 1977. This coding structure is discussed in greater detail later in this chapter.

[2]Basis of Issue Plan indicates the quantity of new or modified equipment planned for each type organization and the planned changes to personnel and equipment.

data base itself; instead, it is a data manipulation capability that draws on existing data bases. HQDA personnel use SACS for:

(1) Force development planning
(2) Distribution planning and capabilities studies
(3) Budget and apportionment request development
(4) Computations of war reserve requirements
(5) Computations of various personnel requirements.

d. Civilian Budgeting System

This MIS provides an automated data base to support the civilian budget process by costing the civilian manpower requirements resulting from particular force structure alternatives. In addition it coordinates spaces and costs across all appropriations that fund civilian personnel.

This is the MIS that is used to update the civilian manpower data in the FYDP.

e. CSFOR-78

This data management system provides the various Army organizations (commands, agencies) with quarterly data on actual and authorized military strengths by officer and enlisted personnel; on civilian strengths by direct hire, indirect hire, other, workload accomplished, man-months worked, and earnings. This report is the basis for much of the management analysis and justification material used in budget formulation and evaluation.

2. Dollar Resource Data Management Systems

a. Procurement Data Base

This data system carries the line item detail that appears in the Procurement Annex. The data are derived from the Army Materiel Plan (AMP), which is the source document from which Army procurement programs and budgets are developed.

b. Program Budget System

The Program Budget System (PROBUS) is a central (Army Comptroller) data base for the Operation and Maintenance, Army (OMA) Appropriation. It contains data by AMSCO program and subprogram, program element, and command. The data cover three historical years, current year, budget year, and the program outyears.

c. Military Construction Program

The Military Construction Program (MCP) is developed in project detail through the major commands. The detail is available for the FYDP update years.

3. The Army Management Structure Code

The Army Management Structure Code (AMSCO), while not a data system, is relevant to any consideration of the capabilities of the Army data systems to provide detailed line items of information that could be aligned with the LRA line items. AMSCO provides codes that permit the classification of planned and actual obligations or expenditures and reimbursements in terms of end objectives.

The coding structure for O&M includes the BOS line items discussed previously in this chapter. In addition to the BOS codes, O&M AMSCO detail is divided into 10 other categories, 1 category for each major force program in the FYDP.

There are five Army procurement appropriations: Aircraft Procurement, Missile Procurement, Procurement of Weapons and Tracked Vehicles, Procurement of Ammunition, and Other Procurement. The codes for these appropriations contain a four-digit "budget program" and a four-digit "project account."

The detail available in these codes could be used to provide line items to be aligned to the LRA line items. However, currently resources are not uniformly programmed in AMSCO detail, and there is no integrated automated programming MIS that would permit the usage of the detail that does exist.

Appendix B

TASK ORDER NO. 78-II-1

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301

MANPOWER, RESERVE AFFAIRS AND LOGISTICS

Task Order to Be Performed
by the Institute for Defense Analyses
for the
Office of the Assistant Secretary of Defense (MRA&L)

As provided for in Department of Defense Contract DAHC 15-73C-0200, dated September 1, 1972, the Institute for Defense Analyses (IDA) is requested to undertake the following task:

1. TASK ORDER NO: 78-II-1

2. TITLE: Guidelines for the Development and Implementation of a Logistic Resource Annex (LRA) to the Five Year Defense Program (FYDP).

3. CONTENT AREA: Logistic Resource Management

4. OBJECTIVES: To validate structural concepts, and to propose guidelines and recommend solutions to problems arising in the development and implementation of a Logistic Resource Annex by the Services.

5. BACKGROUND: Logistic support consumes a significant portion of the resources (funds and manpower) provided to the Department of Defense. These resources are consumed by DOD activities from the organizational level through intermediate logistic support activities to the central, depot level logistic activities. Existing management information system structures (particularly the FYDP and related subsystems) do not provide adequate displays of these logistic support resources by function, organization, weapon system or other categories important for planning, programming, and analysis.

IDA has completed a detailed study defining a Logistic Resource Annex (LRA) to the Navy Five Year Plan (DNFYP). The Logistics Management Institute (LMI) has completed an exploratory study to define a general LRA concept for the Air Force. In December 1977, the General Research Corporation (GRC) is scheduled to complete its study to develop an LRA for the Army.

Based on these studies and evaluations of OSD needs for logistic resource data, OASD (MRA&L) has formulated a structural concept and a set of broad specifications for the development of an LRA. The concept and specifications must now be tested and validated against the existing and potential capabilities of Service data systems to produce the data desired. Guidelines must be developed to identify and define LRA data elements by existing source or derivation from existing Service data systems; and to evaluate changes that may be needed in Service resource data systems to collect needed data, or develop statistical estimating techniques where necessary.

Guidelines must also be developed for the implementation of the LRA, in terms of its operation as an OSD-level data system and its inter-relationships with other existing resource management data systems.

6. SCOPE:

a. This task will focus on the following:

(1) Assess the capabilities of existing or potential Service programming, budgeting and accounting systems to satisfy LRA data requirements. It is assumed that the IDA, LMI and GRC studies will provide sufficient information on Service systems to permit these assessments without extensive additional research. If such research is required, it may be necessary to eliminate one or more Services from coverage in accordance with agreed upon priorities. Service projects for identification of operation and support costs by weapon system (VAMOSC, etc.) will be reviewed for their potential contribution to the LRA.

(2) For those cases where data are not readily available in existing systems, develop preliminary recommendations for modification of such systems or for methods of statistically estimating required data elements.

(3) Produce an LRA data element reference guide to identify the location, data reporting channels and methods of calculation or estimation for data elements and categories. This guide will indicate key relationships and required reconciliations with the FYDP and other resource data systems.

(4) Develop preliminary recommendations regarding systems, procedures and resources that would be required to establish and operate an OSD-level LRA data system.

b. The research priorities to be followed in this task are:

(1) By service: Research will be pursued so that substantial results are achieved for a single Service before proceeding to parallel investigations with the other Services. Desired priority sequence of Service coverage is:

- Navy, including Marine Corps Air
- Air Force
- Army
- Marine Corps Ground Forces

(2) By functional area: Research ... ld concentrate maximum effort on those functional areas for which visibility has been poor in existing resource management data systems or for which some difficulty is expected in obtaining useful data. These areas are:

- Below-depot maintenance, supply and transportation operations (organizational and intermediate levels).

- Maintenance, and related logistics support costs by weapon system.

- Procurement and installation of modification/alteration materiel by weapon system and by purpose (e.g., combat capability, safety, R&M).

7. SCHEDULE: This task covers the period 1 December 1977 to 31 October 1978.

8. PRODUCTS :

a. A final draft report reflecting the scope of the effort described in paragraph 6 above, will be prepared by October 31, 1978 and submitted to OASD/MRA&L upon completion of internal editing and review.

b. Progress reports in the form of informal oral briefings will be made each month or upon request.

9. ESTIMATED LEVEL OF EFFORT: A funding level of $170,000 is authorized for this task. This level will not be exceeded without written approval of OASD/MRA&L.

10. TASK MONITOR: MRA&L Project Officer for this task is Mr. Charles Alcorn who will provide technical guidance and assist in arrangements for access to DOD installations.

ACCEPTED:

Alexander H. Flax
President
Institute for Defense Analyses

Robert B. Pirie, Jr.
Principal Deputy Assistant Secretary
of Defense (MRA&L)

DATE: February 2, 1978

ASSISTANT SECRETARY OF DEFENSE
Washington, D.C. 20301

Manpower,
Reserve Affairs
and Logistics

TASK ORDER Number 78-II-1
AMENDMENT No. 1

TITLE: Guidelines for the Development and Implementation of a Logistic Resource Annex (LRA) to the Five Year Defense Program (FYDP).

PURPOSE OF AMENDMENT: The purpose of this amendment is to increase the scope of work as defined in Paragraph 6 of OASD/MRA&L Task Order 78-II-1. Specifically, the funding level of the task is increased by $25,000 to enable IDA to accomplish the following:

a. Provide more complete treatment of the Army, drawing on the current Army-funded GRC study and integrating those results with work IDA will have done on the other Services.

b. Explore further the problems of establishing an OSD LRA data base.

c. Permit IDA to analyze Navy, Air Force and Marine Corps detailed comments on IDA's draft reports, assess the relevance of their comments in terms of IDA research and, if appropriate, revise the drafts to present results that best fulfill the requirements of the task order.

CHANGES TO TASK ORDER NUMBER 78-II-1 by this AMENDMENT:

This amendment revises the Task Order by substituting the following subparagraphs and paragraphs for those of like designation in the Task Order:

"7. SCHEDULE: This task order covers the period 1 December 1977 to 30 November 1978.

"8. PRODUCTS:

a. A final draft report reflecting the scope of the effort described in paragraph 6 above, will be prepared by November 30, 1978 and submitted to OASD/MRA&L upon completion of internal editing and review.

"9. ESTIMATED LEVEL OF EFFORT: A funding level of $195,000 is authorized for this task. This level will not be exceeded without written approval of OASD/MRA&L.

Robert B. Pirie, Jr.
Principal Deputy Assistant Secretary
of Defense (MRA&L)

ACCEPTED:

Alexander H. Flax
President
Institute for Defense Analyses

DATE: